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Chrysanthemum

CULTURE IN CALIFORNIA

H. M. BUTTERFIELD



CALIFORNIA AGRICULTURAL
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MANUAL 4



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H. M. BUTTERFIELD

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The chrysanthemum cutting shown above was taken from a healthy plant. It is about 6 inches long.

You can start with cuttings—here is the way to select and trim them

The same cutting, made ready for planting, is shown below. Note that the lower leaves have been removed.



Chrysanthemum

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H. M. BUTTERFIELD

WHEN A home gardener becomes an experienced chrysanthemum grower he usually roots his own cuttings if healthy plants are at hand. A beginning chrysanthemum grower finds it easier to plant cuttings already rooted.

PROPAGATE PLANTS WITH HEALTHY TIP CUTTINGS

The Experienced Chrysanthemum Gardener

What to use for cuttings. Tip cuttings about 4 inches long are taken some 4 to 6 inches above the base of clumps selected for vigor, variety, and flowering date. A gardener must be experienced in chrysanthemum growing to know what to choose and what to avoid in appraising the mother clumps.

The chosen clumps are kept in well-drained soil, safe from freezing, in a location where air temperature favors moderate spring growth. Clumps growing in ground to be prepared for another flower crop are dug up, with the soil intact, and are stored in a frame or in a part of the garden where early cuttings can be produced.

If verticillium wilt (see p. 19) is prevalent in the garden, take healthy cuttings from rapidly growing stems above the 18-inch level. At this height from the plant base, cuttings are not so likely to carry the disease. Once verticillium wilt is eliminated from the garden, cuttings can be taken at the usual height from the base of the clump.

What not to use for cuttings. Tip cuttings are never taken from the base of a mother clump where verticillium wilt might be present. And they are never taken from woody shoots. These may fail

to root well, and are usually far less satisfactory than cuttings from vigorous, succulent shoots.

Some gardeners make root divisions. The danger that root divisions may not be as healthy as tip cuttings taken from vigorous plants should be recognized.

How to plant cuttings. Each cutting is inserted into sand or other rooting medium to about half its length. The leaves on the part of the cutting that extends above ground level are left on to speed rooting. The rooting medium is kept moist but not saturated.

Containers used for rooting. If only a few cuttings are planned, root these in individual, shallow pots or even in deep nursery flats. If many cuttings are needed, construct a cold frame. In a cold frame they are usually planted about 3 or 4 inches apart in rows in beds or in benches. Each row is labeled with variety name.

Treatment of early and late cuttings. Early cuttings are best rooted in a heated greenhouse; late cuttings, in beds on ground that will be well drained throughout the rooting period. Temperature is easier to regulate and drainage to control in a greenhouse bench than in a ground bed.

Rooting aided by hormone dusts. Hormone dusts may be applied to the base of cuttings. The base is dipped into



A flower pot or other small container is used for rooting only a few cuttings.



When large numbers of cuttings are set out, it is well to use a standard redwood flat.

the dust, then tapped to remove surplus powder before being planted. Trade preparations of hormone dusts can be purchased at most nurseries.

Length of rooting time. Under favorable conditions, rooting requires about 20 days. The time varies somewhat with variety and with growing conditions.

Transplanting rooted cuttings. Some growers prefer to transplant rooted

cuttings to 2½-inch pots or to plant bands before setting them out permanently. If there is no time for transplanting, then set them directly into permanent location.

The Beginning Chrysanthemum Gardener

Buying from dependable growers. Until a gardener becomes experienced in chrysanthemum growing he will



While not recommended by some growers, chrysanthemums may be propagated by division of clumps. The first step in dividing is shown above.

find it best to buy cuttings already rooted. These should be bought from growers known to have healthy stock. Cuttings from unknown sources may develop a virus disease and serve as hosts for spread of the disease to nearby plants. Such cuttings are never satisfactory.

Nurserymen selling rooted cuttings usually ship plants bare-root, with the cuttings packed in moist sphagnum moss. Occasionally they ship plants in paper

cups with soil about the roots. This practice, however, is not encouraged by horticultural inspectors who find cup-packed plants more difficult to inspect than plants with bare roots.

Placing the order early. When buying rooted cuttings, place the order well ahead of planting. This will assure delivery of the varieties ordered. Most nurserymen in filling orders substitute varieties if their supply of cuttings is low.

PLANT ACCORDING TO A PLAN

The plan of the chrysanthemum garden must meet certain requirements in soil, ventilation, light, space, and irrigation. These requirements are the same whether chrysanthemums are grown outdoors or in a cloth house.

The Outdoor Garden

Soil preparation. The soil needs to be turned and left open to aerate at least a week before planting. During this time, clods can be broken up and the bed raked and leveled. A deep irrigation is given a few days before planting.

When heavy clay soils are very wet they

must not be worked. They should dry out enough to crumble well. Then, with proper management and very little tillage, their crumblike structure will be satisfactory.

Sandy soils are easy to till. They have limited moisture-holding capacity, however, and usually are deficient in organic matter.

Ventilation. Furnish maximum ventilation to the chrysanthemum bed. Avoid garden corners with limited circulation of air. In adequate ventilation, the blossoms will not remain wet during periods of damp weather. Satisfactory air drain-



Here, the division is completed. (The soil was removed from the plant to show root growth.) Position of snips shows where plant should be cut back.

age is also the primary preventive for Septoria leaf spot and petal blight.

Light. Chrysanthemum plants need a limited amount of light throughout the growing season. They will not do well in direct, intense sunlight for the entire day. In early growth their moisture intake will be badly affected; and in the blooming period their color may be damaged. Light must therefore be controlled in some way.

Root space. Chrysanthemums should not have to compete with the roots of other garden plants and shrubs. They need a place to themselves and an adequate distance from one another.

Plant space. This depends primarily upon varietal habits. Close spacing is given to plants that are small-sized; that produce only two or three medium-sized blossoms; or that have an abundance of small, close-hugging blossoms. Close spacing is also used for massive color effects.

Wide spacing is given to plants grown for spray effects or for numerous large blossoms. Wide spacing also admits more light and air to the plant and gives room for irrigating, fertilizing, and dusting and spraying.

Individual plants in the row are usually set at least 8 inches apart for small-growing varieties and 10 inches for large-growing varieties. Plants grown for mass color effects are set 7 to 8 inches apart and for wide spray effects, 8 to 10 inches.

Row space. Plants set in rows are much easier to irrigate and cultivate than plants set at random. Planting beds in the garden are usually 3 feet wide, about 10 to 12 inches apart, with 5 or 6 rows running lengthwise of each bed.

Plants set in double rows need a furrow down the middle and a furrow on each side. Plants set out helter-skelter will have to be watered by hose, sprinkler, or watering can at the risk of damaging stems, foliage, buds, and flowers.

Planning for irrigation. In the long summer and fall drought the plants must

be watered regularly. This means carefully studying the planting area, leveling to prevent erosion, and arranging the beds for easy and efficient irrigation (see p. 6).

Planting time. This depends upon the flowering time of the variety and, in some instances, upon the date the flowers are needed. Most varieties are set out during April and into the first part of May.

Some gardeners begin to plant as early as March. Too early planting, however, causes plants to grow too tall, with consequent hardening of stems before the buds form. Large-flowered varieties are inferior under early planting, some varieties growing to a height of 6 feet or more—too tall for chrysanthemums.

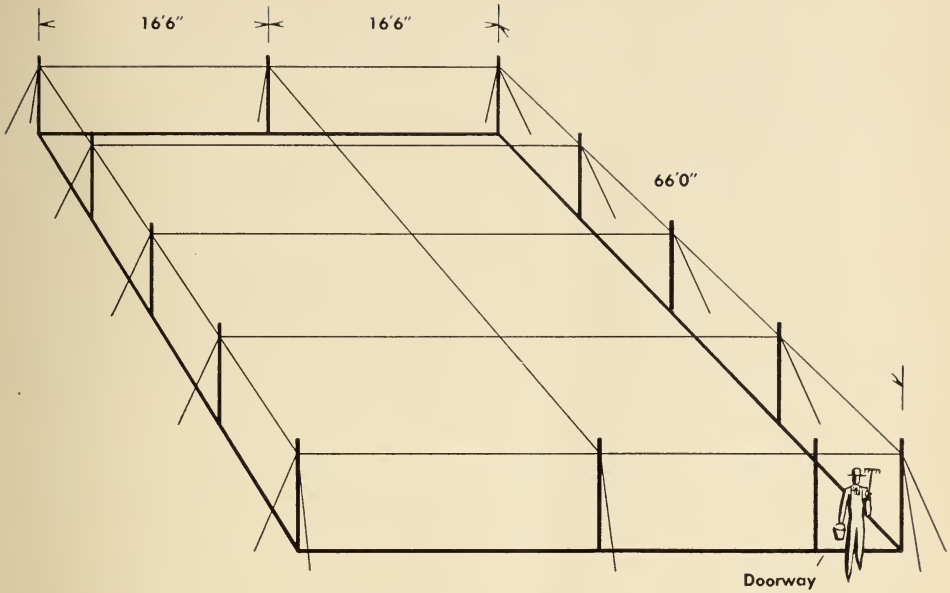
Plant height and support. Tall plants are tied to stakes, or are supported by wire or possibly by cord stretched between stakes driven in along the row. Small-sized, no. 20 galvanized wire is often used by commercial chrysanthemum growers to stretch along the rows, with crossarms of narrow wooden strips fastened crosswise of the beds over the rows. For medium-tall varieties stretch the wires along the row at a height of 3 feet; for tall varieties, 4 feet.

Individual, tall plants can be fastened to wires with any kind of tie that will keep them from falling. Large-flowered plants, which may become topheavy during the blooming period, are usually fastened to individual stakes.

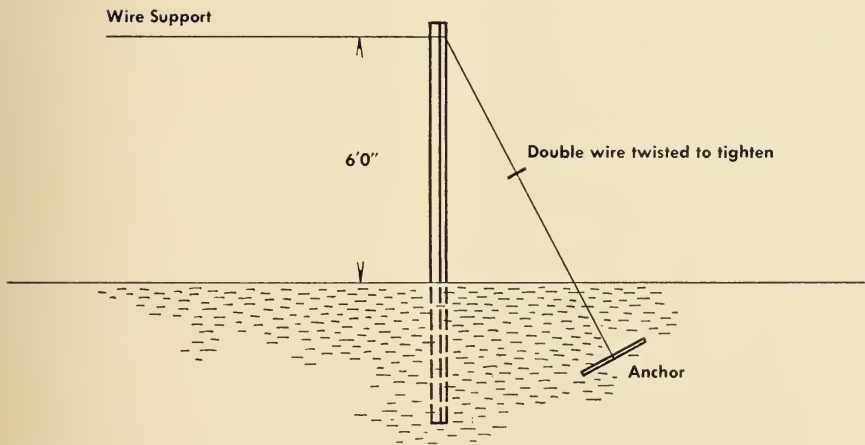
The Cloth House

Occasionally a home gardener decides to become a chrysanthemum fancier and produce large-flowered varieties under cloth. A cloth house is the most practical covering for this type of chrysanthemum growing.

Building the house. A cloth house is at least 6 feet or more in height to allow the gardener room in which to work with the plants without stooping. The house frame is usually built of 2- x 3-inch redwood, with the top and sides covered with



A — Framework with baseboard for cloth house 33'0" x 66'0"



B — Method of anchoring posts

Sometimes a home gardener becomes a chrysanthemum fancier. Then, he will find the cloth house the most practical type of cover.

cheesecloth that either is sewed together or is fastened on in separate strips. The cloth is held in place by strips of plaster lath nailed to the frame. Reinforced in this way the cloth house is resistant to all but a very heavy wind. The door opening can be a wooden frame, with either a cloth-covered, wooden-frame door, or a piece of cloth left loose to be fastened back or to hang across the opening.

IRRIGATE TO ADJUST HUMIDITY, TEMPERATURE, AND SOIL MOISTURE

Regular and Deep Irrigation

Chrysanthemum growth should never be checked by insufficient soil moisture nor water-logged by soil maintained at full water-holding capacity. Irrigation should be frequent enough to produce steady growth, with leaves kept in succulent condition.

Type of irrigation. Furrow irrigation, wherever practicable, is recommended. The furrows are 3 to 4 inches deep and, because they tend to fill with suckers, are approximately 6 inches wide



Basin irrigation for an individual chrysanthemum plant.

The cheesecloth should be of fine mesh—20 x 24 or 24 x 28—which is very satisfactory for shading plants during the growing season.

Planting. This is done in rows, as in the garden, for easier watering and cultivating. The planting beds are 3 feet wide, about 10 to 12 inches apart, with 5 or 6 rows running lengthwise of each bed.

to carry sufficient water for a thorough irrigation. If the plants are in beds sloping lengthwise, it may be necessary to dig cross-furrows that can be filled with water at irrigation. If the plants are in contour position on slopes, they should be furrow-watered by the double-row system.

Basin irrigation may be used around individual plants. The basins are formed far enough away from the plant not to disturb the roots and deep enough to permit thorough watering.

Overhead sprinkling is rarely advisable. The weight of water on foliage often bends unsupported stems; and water striking flowers soon injures them, as is easily seen when petals remain wet for any length of time during rainy periods. If overhead sprinkling must be used, support the plants and try to avoid wetting open flowers. Flooding is successful only on level-surface beds.

How often to irrigate. Irrigation may be necessary twice a week during the warm summer months and only once a week in cool weather. The interval between irrigations depends somewhat on dryness of air and on temperature, but more on diminishing soil moisture. When rains begin, the plants may need little or no irrigation.

The object of irrigation is to saturate all of the soil in the root zone; then to withhold water until the plants use most of the available moisture. The exact time

is usually indicated by both plant and soil. The leaves of a plant properly watered and fertilized will be large, healthy, and succulent. Those of a plant insufficiently watered will turn dull green then gradually wilt. If insufficient soil moisture continues, older leaves will decline prematurely and dry.

How deep to irrigate. Water should run long enough to soak all of the soil in the root zone, which is usually one foot or more deep. Place a hose at the upper end of the furrow and let the water run until the furrow is filled or the water has had time to soak down to the proper depth.

Importance of Salt-free Water

Use water almost entirely free of soluble salts. Well water high in soluble salt should not be used; it will stunt the plants and cause decline. Some people are forced to buy water that is salt free rather than to use local well water that is too high in salt. If water reaches the danger point in salt content, irrigate heavily at each watering to help wash excess surface salt down below the roots.

Indication of too much salt. There is no simple test for determining salt content. Perhaps the best indication of too much salt in soil or water is the severe stunting of plants.

FERTILIZE IN GROWING SEASON FOR HIGH-QUALITY FLOWERS

Chrysanthemum plants are called gross feeders. They can exist and produce flowers on soils of only medium fertility, but unless they receive generous amounts of nitrogenous fertilizer during the growing season their flowers will be of poor quality. This is especially true of large-flowered varieties and less so of small-flowered varieties.

Soil Deficiencies

Most California soils become deficient in nitrogen unless they are given manure or some other form of organic or inorganic fertilizer. Only occasionally are chrysanthemum-growing soils deficient in phosphate, and rarely in potash.

Nitrogen deficiency. This shows in lack of succulence in stems and leaves. This symptom is not conclusive, however, because it is also a symptom of certain diseases. Only by adding nitrogen to a soil can the grower be certain of nitrogen deficiency.

Phosphate deficiency. Poor plant growth and pale-green leaves that are a darker green near the petiole indicate phosphate deficiency. Leaves may drop from the base of the plant upward. This

deficiency is corrected with steamed bone meal or superphosphate.

Potash deficiency. This is indicated by weak plant stems and poor growth. Leaves may be mottled green with browning at the edges. Here, again, application of the deficient chemical is the only test of deficiency.

Nitrogenous Fertilizers

Both organic and inorganic nitrogen fertilizers, or a mixture of the two called *mixed fertilizer*, are used as adjustments. An organic fertilizer, such as fish meal, can be supplemented with an inorganic fertilizer, such as ammonium sulfate. Manufactured sewage sludges are used, but to a limited extent because the supply is not plentiful and the cost is high in proportion to the amount of nitrogen present. Liquid nitrogen fertilizers have been run in irrigation water, but scattering the dry fertilizer along the row is a more commonly used practice among amateur gardeners.

Amount of fertilizer to use. An organic fertilizer containing 6 per cent nitrogen can be used at the rate of 2 to 4 pounds or more per 100 square feet, two

or three times during the growing season. An inorganic fertilizer containing 20 per cent nitrogen can be used at the rate of 18 ounces per 100 square feet. For a light application this amount may be reduced and used more often.

A mixed fertilizer containing 6 per cent nitrogen can be used at the rate of 4 pounds per 100 square feet. Several light applications may be better than one heavy application. Weak liquid fertilizer may be used to force plants for very large flowers. This is applied weekly until color begins to show in the flower buds.

How to use fertilizer. Organic fertilizers are used when the soil is heavy or is low in organic matter; commercial inorganic fertilizers, when the soil needs nitrogen only. The fertilizer is then carried down 6 inches or more to the feeding roots with the irrigation water.

Strong fertilizers must not come into contact with the leaves of the plant.

Testing for right fertilizer. A grower may not know which fertilizer will give the best results. He can experiment by laying out a test plot where different fertilizers are used, and a check plot where no fertilizers are used, then compare the results. Flower quality unfailingly indicates the comparative value of fertilizers. Correctly fertilized plants produce flowers of larger size and better color, and have stronger stems and greener foliage than plants that are not given fertilizer.

Green-manure fertilizer. Growing a green-manure crop to be turned under is impractical. Often, at the very time the crop should be turned under, the chrysanthemum seedlings are ready for planting.

REGULATE GROWTH FOR DESIRED EFFECTS

Growth is regulated by stopping or pinching-back, disbudding, restricting side shoots, training to cascade form, and shading for early bloom.

Stopping or Pinching-back

This practice must be followed with great care. Either pinching back too little or too much will result in low-quality flowers. The technique is the same for all sizes and varieties of chrysanthemums. The difference with each variety and size is in where to pinch back.

How to pinch back. This is done with the tips of thumb and forefinger. The tip growth to be removed is usually close to a bud in one of the leaf axils.

For young plants. A young plant usually is well established in about two weeks after it is set out. Begin to pinch out new tip growth to encourage branching.

For medium-sized varieties. When the young plant has developed three or four eyes or buds in the axils of new-growth leaves, pinch out the growing tip. The remaining buds then can grow.

Select three or more of these new basal shoots to form the flowering stems. Tests have shown that a plant left with two stems will produce flowers as large as a plant with only one stem. A plant left with three stems should produce flowers of adequate size if given sufficient water and fertilizer.

For tall-growing varieties. Some vigorous and tall plants will need pinching-back several times before the stem is allowed to continue growth for flower-bud formation. Pinching-back must be done carefully on tall-growing varieties. Excessive pinching-back may delay flowering and decrease flower size; insufficient pinching-back may result in very tall, hard stems, and low-quality flowers. The interval between the last pinching-back and flowering is about 2½ months for late varieties and as much as 3½ months for some early varieties.

For early pompon varieties. Shading cloth is often used to bring about early August flowering of Gold Coast, Irene, Pinocchio, and Dark Pink Jewell.

Under shading cloth, pinching-back should not continue after the latter part of April.

Disbudding

The terms first crown bud, second crown bud, and terminal bud can confuse the beginner. The illustration below shows where these different buds are located on the plant.

The *first crown bud* is the first bud to form at the tip of a stem. The *second crown bud* forms just below the first crown bud, at the tip of new growth. This bud forms on only a few varieties, such as Alice Benson and Thomas W. Pockett. The second crown bud sometimes makes a better flower than the first crown bud. The *terminal bud* will appear in time if the plant is allowed to continue its growth with the first and second crown buds remaining. Terminal buds develop last.

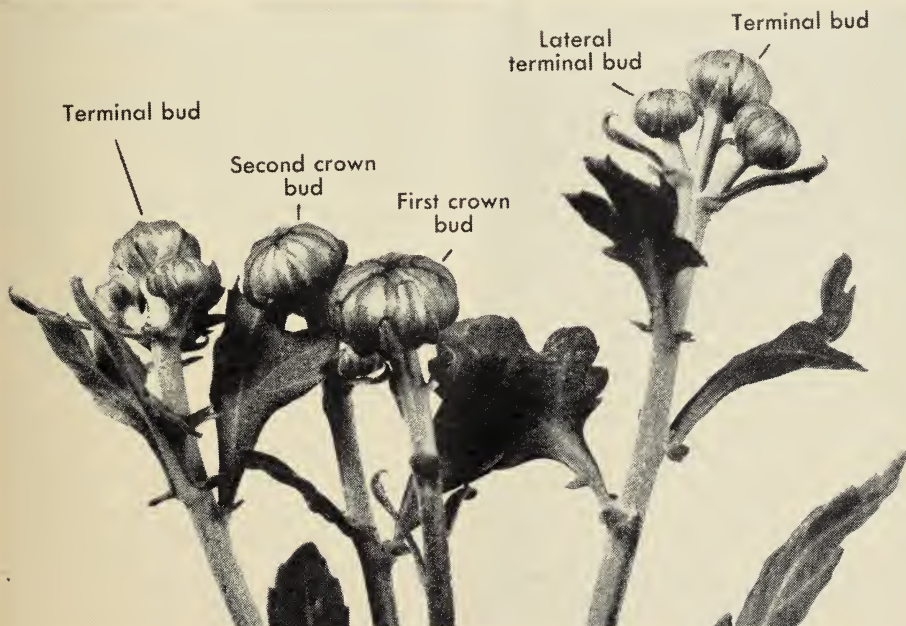
First and second crown buds. If the first crown bud is saved, no terminal buds are allowed to develop. For instance, if the first crown bud is saved in a par-



Here, a plant that has made good growth is pinched back to encourage laterals.

ticular variety, such as Clara Curtis, then all other buds are removed as they appear.

If the second crown bud is saved and the first crown bud is removed, then all



Typical bud growth on a chrysanthemum, showing both terminal and lateral buds. Use this photograph as a guide for disbudding.

later buds are removed. There are many varieties where both of the crown buds are removed and terminal buds are selected, as in Ambassador, Indianapolis, and Orchid Queen. If anything should happen to the terminal bud saved, then the stem might as well be removed, because no more buds will form at the tip.

In some instances the choice between crown buds and terminal buds is determined by bloom date. For example, a delay of two weeks with W. H. Waite will often give a more brilliant color; therefore, the terminal bud might be better than a crown bud. In some varieties the crown bud aborts or is so small that it will not make a good flower. Nothing short of actual experience will indicate whether crown buds or terminal buds should be taken.

Terminal buds. These are produced in clusters of a few to many. On small-flowered varieties no attempt is made to select buds or to disbud; many people prefer the beautiful sprays produced on all of the small-flowered varieties. The plants will develop sprays of both crown and terminal buds, but the mass of terminal buds will give the desired cluster effect. A few large pompon varieties are disbudded, as are some large anemone varieties and a few large singles.

Considerable surplus side growth will develop after disbudding. It may be desirable to check the plants occasionally to remove this side growth, especially the very late side buds growing low on the stems. Unwanted late suckers should also be removed.

How to disbud. Disbudding, like pinching-back, is done with the tips of thumb and forefinger. The unwanted bud is broken off close to where it joins the stem. Try not to leave a stub in the leaf axil. A pointed pencil can be used to break out a small bud.

Chrysanthemum plants should be gone over repeatedly for several days or weeks to complete the work of disbudding. While bending over the plants, avoid

breaking tender selected buds. A little experience will teach how to break unwanted buds gently, close to the main stem so that no evidence of careless disbudding shows later.

Restricting Side Shoots

Most chrysanthemum growers select three of the best stems on a plant for late flowers. They remove all other basal shoots. Only occasionally is a single stem per plant left—this usually by commercial growers.

How to remove shoots. These are never torn from the plant. Tearing or pulling them off leaves a ragged wound; tearing can even peel the surface far down the stem. A shoot is cut out with a sharp knife, or pruning shears, or by pinching out with thumb and forefinger.

Treatment of different varieties. On small-flowered varieties only part of each stem is left to blossom. Remaining side shoots die out from natural shading; others can be removed where necessary. More stems are left on an extremely vigorous plant, such as Alex Stribling, than on a weak plant, such as Bobette, whose size is not improved by thinning or disbudding.

Few gardeners would attempt to disbud a single variety, such as Mrs. Buckingham, or to spend much time thinning the plant, because the size of flowers and sprays would be about the same by either treatment. This is also true of the smaller pompons and many of the anemone varieties. The larger, spider varieties need well-planned restriction of side shoots, especially for exhibition blooms.

Training to Cascade Forms

A few home gardeners who have time and patience train chrysanthemum plants for cascade effect. The technique, usually practiced by fanciers for nursery or flower-show exhibit, must be carefully followed or should not be attempted.

Vigorous varieties with long, flexible stems are trained best into large cascades.

Less vigorous varieties with moderate-length, slender stems and many flowers, are best for small cascades. A spider variety trained to cascade form is shown below. Table 4 lists several varieties used for cascades.

Varieties with only a few flowers do not train satisfactorily, especially when these few flowers are close to the base.

Cascade forms. There are several satisfactory cascade forms. The heart shape is the most popular. The fountain also is well liked, and occasionally a double cascade is seen at flower shows. The thin or narrow cascade, occasionally used, is not popular.

Pots and potting mixture. A terracotta pot, a flower jar, wooden tub, or box, which can be kept at elevation during the training period, are used for planting. The starting pot for the young plant is usually 4 to 6 inches in diameter. As the plant roots grow to the walls of the container, the plant is transferred to a larger container. This process may be repeated two or three times. The final potting should be completed by about the middle of August. At this time the plant may be in a 10- or 12-inch container.

The transfer from one pot to another must not disturb either roots or top growth. If the solid earthen form encasing the roots cannot be easily lifted from the pot, the pot should be cracked, spread apart, and the form removed.

The potting mixture can be 2 parts fertile loam soil, 2 parts well-rotted oak leaf mold, and 1 part well-rotted steer manure.

Exposure for plant. A plant in training is placed in a warm, southern exposure, protected from wind and rain. The plant container is elevated on a bench or shelf, at least 3½ to 4 feet from the ground so that the final cascading branches will not touch the ground. In a

Small pompon, such as Nuggets (above), and spider varieties, such as Sarah (below), can be trained to cascade form with beautiful effect, as shown here.



greenhouse, set the pot near the front of a bench. With adequate water and fertilizer the plant should grow vigorously.

Length of training period. The planting date for cascade forms is gauged somewhat by variety. However, the young plant or seedling is usually set out in the 6-inch pot in early May.

The exact dates of training completion vary according to variety and growing conditions, but by September 15 the final pinching-out of the plant should be completed. The training technique outlined here holds true for all cascade varieties regardless of varietal dates in planting or flowering.

Steps of training. When the plant is 5 or 6 inches tall, the top is pinched out. This encourages branching at the base. From the branching growth is selected the endmost shoot to be used as the main leader. As growth continues, or in about two or three weeks, begin to pinch out all new side growth at every second or third leaf joint until the first of September. After that date do not pinch out any more side growth.

When the plant is about 12 inches tall, frame-training can begin. Insert a framework of 10- or 12-gauge galvanized iron wire to which the stems will be tied. A single wire, 3 feet long, will be adequate at first, but, as training continues, additional wire, 4 feet long, will have to be inserted. Commercial plant ties are very useful for fastening stems to the wire supports.

The main leader is lowered gradually as the wire support is bent down farther. One by one the laterals also are bent. Beginning 5 inches above the surface level, they are tied to training wire that is bent at an angle of 45 degrees. This gradual downward bending of all wires continues until middle September, when the plant should be almost horizontal. The stems should still be flexible.

The lateral stems, whose buds were pinched out repeatedly, are now ready to be spread out in equal numbers on

either side of the main leader to produce a well-balanced plant. The still-flexible stems are tied into position and will gradually form the planned shape of the whole plant.

Cascade plants tend to start blooming at the tip, ahead of side or lower branches. This tendency can be changed by completing the pinching-out of basal laterals around the first of September. The broadest part of the plant will be completed about five days later; the midsection in another five days, or by about September 10; and complete pinching-out of the tip will be accomplished by the middle of September. This gradual completion of pinching-out from base to tip over a period of about 15 days encourages an even maturity of flowers over the entire plant.

The flower buds forming after the last pinching-out will weight the stems and aid the wires in bending the plant downward. Bending usually is completed by the time flower buds show color. At that time all stems should point downward, with side branches hanging in final form as a fan.

Shading for Early Bloom

Shading is a technique used by some gardeners and commercial growers to produce very early bloom. Its effect on size and quality of bloom has been tested by growers in central California; more tests are needed to determine its full success with chrysanthemums in other areas.

What shading does. It limits day length to 12 to 13 hours for approximately 40 days during June, July, and August. The exact number of days is gauged by varietal differences. Correctly done, shading can advance the bloom date by 25 to 56 days.

Shading not only regulates light intensity; it also conserves moisture in soil and air. The increase in humidity under cloth tends to reduce water requirements. It raises the temperature about 1 to 3 degrees Fahrenheit, which is satisfactory

to some varieties but unsatisfactory to those that do not form buds in temperatures below 60° F.

Amount of light needed. Duration of light rather than variation in normal light intensity regulates the time of flower-bud formation. Anything above 4,300 foot-candles of light will probably be adequate for the 12 hours of daylight allowed to shaded plants. The light under greenhouse conditions varies between 4,300 and 4,400 foot-candles. The light under black shading cloth is cut to less than 50 foot-candles.

If the weather is overcast during the normal shading period, shade only on alternate days; otherwise failing plant strength will cause the stems to remain short. Unless the plants are adequately watered and fertilized and given sufficient light, air humidity, and ventilation, this marked variation in shading technique will leave the weakened plant highly susceptible to fungus troubles.

Effect on bud formation. Shading tends to cause terminal rather than crown buds to form. This is satisfactory for those varieties on which a terminal bud is selected. But for such varieties as Alice Benson, Clara Curtis, and Unaka, on which a crown bud is selected, shading may not be desirable.

Effect on bloom size and quality. This was tested by the Ohio Agricultural Experiment Station on such varieties as Ambassador, Betsy Ross, Chieftain, Friendly Rival, Golden Bronze, and Indianapolis. The experiment indicated that shading did not materially affect size and quality of bloom, whether two or three stems were left on a plant or only one.

Varieties responding to shading.

Early midseason varieties respond best to shading; they require about 36 days of shade. Many of the pompons respond to shading. They require 36 to 40 days or more of shade, depending on the variety, with the cloth removed when the buds begin to show color.

Large standard varieties will probably need shading for approximately 40 days in June and July. Very good results can be expected in about 40 days for such large varieties as Ambassador, Hilda Bergen, Indianola, Silver Sheen, and Snow White. Shading should continue with these varieties until the flower buds are showing color.

The harvest season for both large- and small-flowered varieties can be extended by planting at intervals of one to two weeks, rather than all at one time.

Hours of shading. The cloth is pulled over the plants at about 5 p.m. daily. It is removed the next morning between 7 and 8 a.m.

Treatment of cloth. Black shading cloth comes in bolts of 100 yards, one yard wide. Various grades are sold, but a black sateen known as Windsor cloth no. 375, with a mesh of 64 x 104 to the inch, proved best in the tests reported by the Ohio Agricultural Experiment Station. This cloth admitted only 1.9 foot-candles of light, or 0.04 per cent of the total light.

Shading cloth is usually sewed together to make 5- or 10-foot strips. For tall varieties, the top shading cloth should have a side clearance of about 5 feet, and an allowance of 5 feet for side curtains. Allowance must also be made for some sagging of the cloth between supports.

CLASSIFICATION

VARIETAL TABLES

Chrysanthemums are classified according to certain characteristics of their blooms. A description of the classifications, together with illustrations of some, begins on page 23. Tables listing a great many varieties and comments on each begin on page 30.

PRODUCE NEW VARIETIES BY SEEDING AND SELECTING BEST OF SEEDLINGS

The term new variety usually means a new, cultivated form developed from seed. Only occasionally does it mean a new variety accidentally appearing in the garden by mutation. About three years of testing are needed to determine the nature and worth of any new seedling variety. Only then, and after it has met the approval of national chrysanthemum organizations and leading fanciers, is it named. The name chosen is one not yet used for a chrysanthemum variety.

The simple manual techniques of seeding, planting, pollinating, and cultivating are easier to learn than the more difficult details of line-breeding. Line-breeding calls for a knowledge of good parent stock and of the desirable inheritable characteristics from such stock.

New Varieties by Line-breeding

Good parent stock. The experienced breeder in time learns which parents give rise to desirable seedlings. He also learns which characters are inherited in pure form from each parent. Line-breeding may be used to determine the nature of inheritance.

Desirable inheritable characteristics. These are good stem, color, size, and flower form. Each of these characteristics must be considered when inspecting the inherited characters in seedlings.

Producing the seedlings. Seed is produced on single-stem plants grown in the garden or in pots in a greenhouse. Only a small amount of fertilizer is needed in either type of planting. The flowers of garden plants are covered with a cellophane bag to help exclude foreign pollen and to lessen danger of early rain damage. The flowers of greenhouse plants also are covered with a bag, to exclude foreign pollen that might accidentally be introduced by insects.

Before any pollen is shed, both petals and stamens are removed from each

flower. The pollen from the desired parent is then introduced when the pistils are receptive, that is, when the pollen grains are sticking to the stigma. Records of both seed and pollen parent are kept.

Seeds ripen in about six weeks; they are sown immediately in any good, light soil mixture in air temperature of 60° F. When the seedlings become crowded, they are transplanted. They should flower the first year.

New Varieties by Mutation

Occasionally a new color form will appear on a plant as the result of mutation. This sudden and permanent change in a plant or on part of a plant may be a desirable mutation that can be reproduced true to the new form by rooting stem cuttings in the usual way. Selections are made at flowering, when it is possible to see whether the new color or form of the plant is uniform. Any plant not conforming to the new color or form should be discarded.

Experiments in Chrysanthemum Breeding

There are almost no references on chrysanthemum breeding. One, coauthored by Elmer D. Smith and Alex Laurie, and now out of print, is listed among the references in this circular. In earlier years, Mr. Smith of Adrian, Michigan, introduced many varieties that are still popular.

In time, reference material may result from experiments being conducted by the United States Department of Agriculture at the Horticultural Station at Beltsville, Maryland, and by the universities of Chicago and Minnesota. Experiments conducted by the Oakland, California, Park Department have produced several new varieties. The Park Department has held a chrysanthemum show annually since 1940.

CONTROL PESTS AND DISEASES

Several pests and diseases attack the chrysanthemum, sometimes with very damaging results. Neither all of the pests nor all of the diseases described attack in one garden or in one locality, but, because they all do occur in the state, growers should be able to recognize them and know about their control. To begin yearly with healthy cuttings and attempt to plant in uninfested soil is probably the best means of controlling both insects and diseases.

When using any chemical spray or dust for either pests or diseases carefully follow the directions printed on the container. This will assure more successful results and will serve to warn the user if the chemical is poisonous to human beings and animals and must be handled with unusual caution.

Pests

The most important pests attacking the chrysanthemum are aphids, caterpillars, chrysanthemum gall midges, ground mealybugs, leaf miners, spider mites, and thrips.

Aphids. These include the chrysanthemum aphid (*Macrosiphum sanborni*), cotton aphid (*Aphis gossypii*), green peach aphid (*Myzus persicae*), leaf-curl plum aphid (*Aphis helichrysi*), and thistle aphid (*Anuraphis cardui*). Aphids or plant lice attack either in the garden or under cloth and glass. Their damage to the plant is in a mottling of the leaves or flowers and an accumulation of honeydew on the plant.

Begin control as soon as aphid colonies appear. Control can be complete with weekly applications of any one of such insecticides as nicotine sulfate, benzene hexachloride, lindane (which is the pure gamma form of benzene hexachloride), pyrethrum, and light oil emulsions. Several new products being tested show promise. Some of them may become substitutes for older products that have been used for many years.

Caterpillars and other leaf-eating insects. These include the greenhouse leaf tier (*Phlyctaenia rubigalis*), checker spot butterfly (*Euphydryas chalcedona*), orange tortrix (*Argyrotaenia citrana*), and sometimes the woolly bear caterpillar of the *acraea* moth (*Estigmene acraea*). Caterpillars occasionally attack opening buds and late-season flowers, but with limited damage. If only a few such caterpillars appear, eliminate them by hand picking.

In control, use a 50 per cent wettable DDT at the rate of about $\frac{1}{3}$ ounce to a gallon of water for all leaf-eating insects except the woolly bear caterpillar and the orange tortrix. Use pyrethrum sprays or dusts in repeated applications to destroy these two pests.

Chrysanthemum gall midges (*Diarthronomyia chrysanthemi*). This pest can seriously damage leaves and growing tips of chrysanthemums, especially if plants are not started from healthy cuttings each year. The adult midge lays



Distortion of this leaf was caused by the chrysanthemum gall fly or midge.

clusters of tiny red eggs on the leaves or young tips, and the small maggots that hatch soon penetrate the tissues to produce cone-shaped galls or raised bumps on leaves and stems. A serious infestation will stop all plant growth and deform remaining stems and buds. This pest is more serious in shade than in sunlight, either in the garden or under cloth and glass. Highly susceptible varieties are White Mensa and Golden Mensa.

Prevention is the best method of control. Plants started yearly from clean tip cuttings will probably not be attacked. Control with chemicals must begin early to be successful. Benzene hexachloride gives satisfactory control. Lindane is not so satisfactory. Allow $\frac{1}{2}$ ounce of 10 to 12 per cent gamma isomer benzene hexachloride to $3\frac{1}{8}$ gallons of water.

Ground mealybugs (*Rhizococcus fascifer*). This pest is much smaller than the common mealybug, such as Baker's mealybug. It lives on the roots of herbaceous plants, including the chrysanthemum. If the roots of a plant become infested, yet the variety cannot be replaced easily, take off healthy tip cuttings and root these. If these healthy cuttings are planted in new soil uninfested with the pest, the roots will not become infested.

Again prevention is the best method of control. Starting with healthy cuttings yearly and planting in a new garden location is best. If the pests appear, expose them to dehydration by cultivating the beds. Ground mealybugs cannot endure exposure and consequent drying-out. Before planting in an area known to be infested, cultivate the soil for about six weeks to dry it out. This may rid the bed of all pests. For greenhouse cultivation, sterilize potting or bench soil before planting.

Control by spray is not successful around the roots of infested plants. Unplanted beds can be fumigated with ethylene dibromide or dichloroethyl ether to destroy any insects present.

Leaf miners. The chrysanthemum leaf miner (*Phytomyza atricornis*), the burdock leaf miner (*Dizygomyza maculosa*), and perhaps other species, such as *Agromyza setosa*, may attack chrysanthemum stems and leaves. The small maggots tunnel through the surface tissues and discolor the affected parts. Winding mines or blotches just beneath the surface tissue indicate leaf miner damage. The adults may also puncture the tissues. Severe injury makes the foliage unsightly; it may also cause premature leaf drop.

For control, some of the new insecticides, including chlordane, benzene hexachloride, and lindane, are promising. Allow $\frac{1}{2}$ to 1 ounce of actual chlordane—preferably in wettable powder form—to $3\frac{1}{8}$ gallons of water. Benzene hexachloride and lindane may be used at the rate of $\frac{1}{2}$ ounce of 25 per cent gamma isomer to $3\frac{1}{8}$ gallons of water. This spray should be effective if applied at intervals of from one to two weeks.

Spider mites (*Tetranychus bimaculatus*). The common red-spider mite or two-spotted mite, found on many plants, is sometimes a pest on chrysanthemum leaves. It increases very rapidly under cloth or glass. This mite forms a small, thin web on leaves and flowers. It hides mostly on the underside of the leaves. By sucking the juices, it drains the green color, which leaves a blotched effect. The leaf is then weakened.

Control of the two-spotted mite with sulfur dust is not very effective. A trade product known as Aramite is very effective. It is available directly from chemical supply companies but not usually available in small-sized packages from garden supply houses. A combination spray packaged in small amounts for use in the home garden is planned by a large chemical company in California; the two materials to be used are malathion and lindane, which should control such chrysanthemum pests as mites, aphids, and caterpillars.

Thrips. Several kinds of thrips may attack chrysanthemum plants, including flower thrips, onion thrips, chrysanthemum thrips (*Thrips nigropilosus*), banded greenhouse or sugar beet thrips (*Hercinothrips femoralis*), and statice thrips (*Haplothrips leucanthemi*). These small, rasping insects attack tender growth, where they produce scar tissue. In severe infestations all new growth may be stopped.

Control by several new insecticides is prompt and effective. DDT, benzene hexachloride, and lindane sprays or dusts are very effective. Start control before damage is severe. The same amounts of DDT, benzene hexachloride, and lindane used to control leaf miners, midges, and leaf-eating insects will also control thrips.

Miscellaneous insects. Chrysanthemums are attacked by other insects, such as plant bugs, leafhoppers, and whiteflies.

Plant bugs (Lygus bugs) occasionally damage both flowers and leaves. Where they feed at the base of a flower, that point ceases to develop and growth becomes one-sided. Where they feed at the young leaf buds, the leaves show a lacy perforation.

Control by growing the plants under cloth or glass is fairly effective. Chemical control is by spray, with 50 per cent wettable DDT at the rate of $\frac{1}{3}$ ounce to a gallon of water.

Leafhoppers occasionally are troublesome. These may be checked by the same proportions of 50 per cent wettable DDT spray used for plant bugs.

Whiteflies sometimes spread to chrysanthemums from nearby host plants. Control by a spray of DDT and summer oil is effective. Oil combinations with nicotine sulfate or pyrethrum give fair control.

Diseases

Diseases to which chrysanthemums are susceptible are aster yellows; basal rot of cuttings; *Deuterophoma* disease; leaf spot; petal blight; powdery mildew;

rust; spotted wilt; verticillium wilt; and virus stunt.

Aster yellows. This virus disease, also known as Yellows, may attack chrysanthemums. Infective leafhoppers spread it from diseased host plants. The pest may be excluded to some extent by cloth or glass. Since there is no cure or control, select cuttings from healthy plants only.

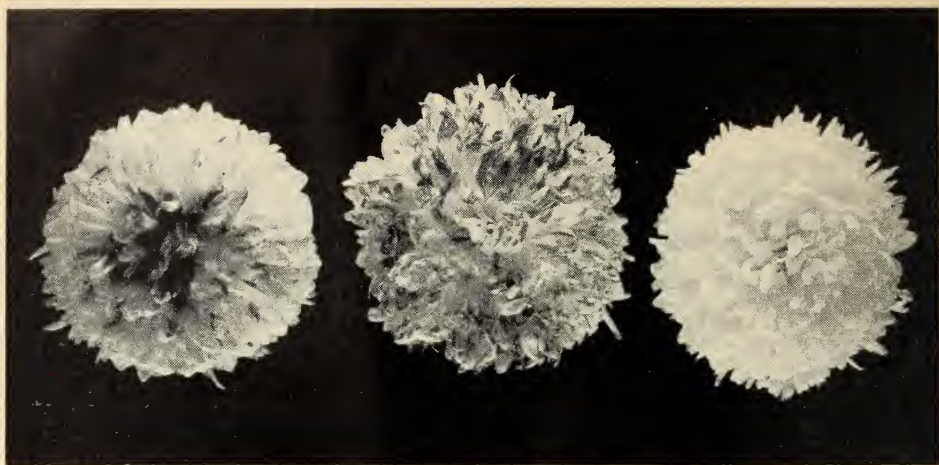
Basal rot of cuttings. Basal rot of soft green cuttings is seen occasionally in propagating benches. It causes serious losses from January to April if cuttings are kept very wet at a cool temperature. *Sclerotinia sclerotiorum*, as well as species of *Fusarium* and *Pythium*, may be involved. Good ventilation and small amounts of moisture during rooting are important preventives. The best control is to take cuttings only from healthy plants and root them in a sterile medium, such as vermiculite. Rooting under glass or muslin rather than in dense shade reduces the danger of basal rot.

Treating the base of cuttings with Fer-mate has been attempted. Results were spotty, perhaps because too many different organisms were involved, some of which are effectively controlled by Fer-mate and others not.

Deuterophoma disease. This slow-acting disease is caused by a fungus that invades the vascular system of the plant. The fungus is soil-borne, and once it infests the soil it will attack even clean cuttings. Affected plants often bloom earlier than healthy plants, and develop a stunted appearance similar to that caused by virus stunt. Healthy plants set into infected soil will produce normal flowers the first season; cuttings taken from the plant, however, will produce badly stunted plants the second season.

The only possible control for *Deuterophoma* disease is to use disease-free cuttings, and even these can be attacked by soil-borne infestation.

Leaf spot. Septoria leaf spot is caused by two different species of *Septoria*: *S. chrysanthemi* and *S. obesa*. The form *S.*



Flower blight here was caused by *Botrytis cinerea* (see petal blight, below). The healthy flower at extreme right is shown for comparison. (Courtesy Department Plant Pathology.)

chrysanthemi produces dark leaf blotches up to $\frac{3}{4}$ inch in diameter. Lower leaves are affected first. The diseased leaves soon die, but may continue to cling to their stems. *S. obesa* produces the same general symptoms.

Septoria leaf spot is primarily a greenhouse trouble. It should not occur if ventilation is adequate and if irrigating is done without splashing. If it does occur, it can be checked to some extent by spraying with Parzate, Fermate, or Dithane D-14.

Petal blight. The fungus *Botrytis cinerea* causes petal blight. It may be expected during cool weather when excessive moisture remains on flower heads for several hours. Among the varieties susceptible are Arcadia, Jewell, Nellie Pockett, White Mensa, and Yellow Dot.

Control is by preventive measures. Plan the chrysanthemum beds for adequate ventilation so that excessive moisture cannot remain on the flowers during cool, wet weather. Under cloth, plants will be less likely to suffer blight if intermittent openings are left in the roof. There will be far less humidity during rainy weather under cloth ventilated in this way than under a solid cloth roof.

Powdery mildew (*Erysiphe cichoracearum*). This white fungus often attacks

the leaves of plants, grown in shady spots, during the latter part of the growing season. The leaves are covered with a white mildew fungus that resembles rose mildew.

Control is with liquid-sulfur sprays and sulfur dusts. A 1 per cent lime sulfur solution and a wettable sulfur spray have also been used. Follow the directions given on the containers.

Rust (*Puccinia chrysanthemi*). Rust fungus blights the leaves and in time covers the affected foliage with dusty, brown spores.

The best control is to destroy all badly affected plants and to start yearly with disease-free new cuttings on ground where the fungus has not occurred.



Chrysanthemum rust pustules on the backs of leaves. (Courtesy Department Plant Pathology.)

Control tests conducted in California in 1949 indicated that rust may be controlled with either Parzate or Dithane D-14 applied at weekly intervals. Parzate is used at the rate of $\frac{1}{3}$ ounce to a gallon of water. Dithane D-14 is applied at the rate of about $\frac{1}{3}$ fluid ounce to a gallon of water. Zinc sulfate is added to the Dithane D-14 spray at the rate of about $\frac{1}{6}$ ounce to a gallon of water.

A spreader or sticker is added to either spray material. For example, if du Pont Grasselli Spreader-Sticker is used, the rate is 1 part to 1,000 parts of spray. Any spreader should be used according to instructions on the container. Spraying should begin at the first appearance of rust spots, with the spray completely covering the under surface of the leaves.

Verticillium wilt (*Verticillium albo-atrum*). This fungus is not limited to soils in which chrysanthemums grow. It has often severely injured field crops, such as cotton, tomatoes, and strawberries.

Leaves of chrysanthemum plants attacked tend to wilt at the margins then turn brown. They die progressively upward from the base of the plant. If blossoms are affected, the outer petals look burned.

Verticillium wilt can be suspected when many dead leaves appear near the base of a plant and dying leaves spread upward. A cross-sectioning of the stem near the ground may show a discoloration or browning of the woody tissue, also a symptom of the disease.

Visibly sick plants showing stunted growth are usually considered beyond recovery and are discarded. Sometimes, however, a grower may attempt to save a severely infected yet valuable plant for its cuttings. He may hope to control the wilt to a small degree by growing the plant with a scanty amount of soil moisture. This is a drastic, emergency treatment, recommended only for a valuable plant. When the time is ready for cuttings they should be taken from the plant only at the 18-inch level.

A temperature of 60 to 75° F is most favorable for the disease, but if a plant is already infected, the fungus may persist beyond this range of temperature.

Preventive rather than control measures are used with verticillium wilt. Avoid planting chrysanthemums on the same soil continuously for several years. To do so leads to the soil's increased sus-



Effect of verticillium wilt on leaves of chrysanthemum (above) and on stems (below). The disease is caused by a soil-borne fungus. (Courtesy Department Plant Pathology.)

ceptibility to the disease, especially if the soil is kept fairly moist and at a temperature of 60 to 75° F.

For greenhouse planting, sterilize the soil used in pots or beds. A limited amount of soil can be sterilized with 1 cc of chloropicrin to a gallon of soil. Some people use up to 7 to 10 cc of chloropicrin to a cubic foot of soil, although the smaller amount has proved adequate in central California.

For garden and field planting do not use soil where susceptible crops, such as cotton, tomatoes, and strawberries, have grown; and do not use soil in which verticillium wilt has actually appeared. If space is limited, and the same soil must be used yearly, select varieties that are resistant. The grower should therefore know what varieties are resistant and what are susceptible. A few varieties are listed here according to whether they are: (R) resistant; (M) moderately resistant; and (S) susceptible.

Large commercial and exhibition varieties:

Albatross (S)
Ambassador (M)
Anaconda (S)
Apricot Queen (M)
Betsy Ross (R)
Bronze Frick (S)
Bronze Orchid Queen (S)
Detroit News (R)
Friendly Rival (R)
Garnet King (R)
Gladys Pearson (S)
Good News (R)
Helen Frick (S)
Hilda Bergen (S)
Indianola (R)
Ivanhoe (M)
J. W. Prince (R)
Maj. Bowes (M)
Monument (R)
Orchid Queen (S)
Penrod (S)
Pink Turner (S)
Silver Sheen (R)
Snow White (M)
Thanksgiving Pink (R)
William Turner (S)
Yellow Ambassador (M)
Yellow Monument (R)
Yellow Turner (S)

Anemone varieties:

Dark Pink Norma (M)
Enchantress (S)
Estrelita (R)
Frieda (S)
Garza Supreme (S)
Little America (R)
Long Island Beauty (R)
Nevada (S)
Norma (M)
Orchid Beauty (R)
Shasta (S)
The Titan (M)
Yolanda (S)

Pompon and decorative varieties:

Arcadia (R)
Avalanche (R)
Burgundy (R)
Clara Jameson Improved (R)
Firebird (R)
Gold Coast (M)
Golden Feather (Source d'Or) (R)
Irene (R)
Jewel (R)
Lillian Doty (R)
Masterpiece (R)
Navaho (R)
Nuggets (R)
Pink Dot (R)
Pinocchio (R)
Robin Hood (M)
Seafoam (R)
Seagull (R)
Thyra (R)
William Doty (R)
Yellow Bushnell (M)
Yellow Fellow (R)
Yellow Hammer (R)

Single varieties:

Dark Pink Valencia (S)
Ida Skiff (R)
October Pink (M)
Valencia (S)

Hardy varieties:

Indian Summer (R)
Normandy (R)

Virus stunt. This disease is transmitted to chrysanthemums by aphids that have fed on diseased plants; and by cultural operations, such as tilling, fertilizing, disbudding, and tying, where implements or the grower's hands are contaminated by work on diseased plants.

In most commercial varieties the disease takes from 4 to 6 months, and in some varieties 10 months, to become noticeable. Affected flowers bloom too early, on stems much shorter than normal. Color-fading follows—red flowers tending to fade into yellow or dirty white.

There is no control of virus stunt except to start with disease-free rooted cuttings. At present, disease-free rooted cuttings are available only in the eastern states. In time, guaranteed disease-free cuttings may become available in California so that chrysanthemum fanciers will be in a position to start with healthy stock.

Miscellaneous diseases. Other diseases occasionally attacking chrysanthemums include bacterial fasciation; rhizoctonia root rot; and stem canker or stem rot.

Bacterial fasciation or "cauliflower" condition is caused by *Bacterium fascians*. When found, it is on stems close to the ground in both garden and greenhouse. The best control is to propagate with disease-free cuttings and to plant in disease-free soil.

Rhizoctonia root rot is caused by the fungus *Rhizoctonia solani*. It severely damages chrysanthemum plants grown in the open by a brown rot that develops at the base of the plant. The fungus is not limited to chrysanthemums; it attacks several kinds of ornamental plants and thus provides many sources of infection.

Control is preventive. Since the fungus may live over in the soil from one year to the next, gardeners should try to plant in disease-free soil. Some gardeners have even replaced soil where rotation was impossible. Potting with sterile soil should also help.

Stem canker or stem rot, caused by the fungus *Sclerotinia sclerotiorum*, also attacks several different kinds of plants. It is one of the soil-borne and wind-borne diseases that is hard to control in most gardens.

In the soil-borne phase, the stems near the ground level are attacked. This is indicated by a white surface mold that causes the plants to wilt and suddenly die. In the wind-borne phase, the leaves, blossoms, and stems are attacked by spores blown from surrounding weeds or infected plants of many kinds or from small mushrooms formed on the garden soil by the disease.

Control is by preventive measures. It consists of planting in disease-free soil, even to replacing infested soil with disease-free soil and to planting in sterilized soil. These precautions, however, do not rule out the possibility of wind-borne infection. Irrigation also is an important factor. Do not keep the soil around the plants too wet; and do not water overhead. Wide spacing between the plants also is important. Remove and burn all diseased clumps.



Plant in foreground was affected by stunt disease. Compare its height with that of normal plant in background.

USE EITHER COMBINED-SPRAY OR SEPARATE- SPRAY PROGRAM

Combined-spray control for various pests and diseases is used by some gardeners; separate sprays for the different pests and diseases as they actually appear are used by others. This difference in choice depends on the numbers and kinds of pests and diseases present or anticipated. If only one pest or disease is involved or if the combined spray is not entirely effective, then to use separate sprays may be the best plan.

DDT is combined with chlordane and wettable sulfur, and also with summer oils and lindane. Nicotine sulfate is combined with DDT, summer oils, and wettable sulfur, but is not used with lindane.

Wettable DDT is used for chewing insects, the gall fly or midge, and thrips; Toxaphene for chewing insects, aphids, mites, and thrips; lindane for gall flies or midges, leaf miners, and thrips. Parzate, Fermate, and Dithane D-14 are used for some kinds of leaf spot, powdery mildew, rust, and damping-off.

The container for each spray material usually lists combinations permitted and combinations to be avoided. The label should also indicate whether the spray is poisonous. If directions do not appear on the container or cannot otherwise be obtained, ask an authority, such as the Farm Advisor or a reputable nurseryman.

SELECT EXHIBITION BLOOMS ACCORDING TO FIVE MARKET GRADES

Few home gardeners are interested in the market grading of chrysanthemums. But growers attempting to produce high-quality exhibition blooms should know by what measurement they can select suitable flowers.

On some of the eastern markets the large-flowered varieties are grouped into five grades by size. Stem length is 30 inches or longer; foliage and flowers should be free of insect injury, disease, or other blemishes. Grades of large disbudded chrysanthemums, approved by the New York State Flower Growers, are as follows:

Grades of large disbudded chrysanthemums	Flower diameter (inches)
Exhibition	More than 7
Special	6-7
Fancy	5-6
Extra	4-5
First	Less than 4

Stem length is 30 inches or longer; foliage and flowers are free of insect injury, disease, or other blemishes.

Small-flowered varieties or pompons are listed as First, Extra, Fancy, and Special. Stems of Extra and Fancy grades are 20 to 30 inches long; stems of Special are 24 to 36 inches. Stems should be reasonably straight; foliage and flowers should be free of insect injury, disease, or other blemishes.

When selecting flowers for exhibit, choose only those that most nearly meet the grade requirements given by the New York State Flower Growers.

Chrysanthemum flowers are picked for both home use and exhibition when they are in prime condition. If picked when somewhat immature, flowers tend to wilt prematurely; if picked when too old—that is, when they have started to fade—chrysanthemums cannot be expected to last very long.

The flowers of single, open-center varieties should be picked when the first two outer rows of stamens have appeared. Flowers of larger varieties should be picked when the petals are well matured, but have not yet begun to fade.

CLASSIFICATION OF CHRYSANTHEMUMS

Chrysanthemum flowers are classified as to form, size, and color, and sometimes as to season of bloom and resistance to cold (table 2). Some fanciers are interested in training plants into some special form, such as cascade (table 4) or fountain. A few chrysanthemums are flowered in pots for exhibition. Odd forms (table 3) may be of interest.

Nurserymen who sell plants have classes such as those listed in the tables, but no widely recognized system of classification for exhibition purposes has yet become official. A few fanciers have been trying to improve the classification, and there is already considerable agreement among them, although the relative order of the classes may differ. The following classification for show purposes is presented with the hope that it will help beginners interested in the different flower types and the names applied. In time an official system of classification that is widely recognized should be adopted. The following descriptions may be used to determine where any particular variety should be placed for exhibition purposes.

I. Singles Section (table 1).

A. Standard Singles. Should have from 1 to 5 rows of petals and an open center or disk; petals of moderate breadth.

1. Small: not over 2 inches in diameter. Examples: Anna, Jane Harte (sport of Anna).
2. Intermediate: over 2 inches but not over 4 inches in diameter. Examples: Mrs. Buckingham, October Pink, Red Daisy.
3. Large: over 4 inches. Examples: Gretchen Piper and Valencia, when well grown and disbudded.

B. Broad-petaled Singles. Petals normally very broad, as in some

dahlias. Examples: Buttercup, Carmen, Golden Pride, Paloma, Sensation. (Note: Single spoon and matchstick types are listed under Spoon Chrysanthemums.)

II. Semidoubles Section.

Flowers with more than 5 rows of ray petals and with disk showing. Some chrysanthemum catalogs list single varieties with several rows of petals (4 or 5 rows) as semidouble, but this term really applies to the more markedly doubled kind that retains an open center. Few varieties fall within this section, so there is little need to make a further segregation as to diameter of

Left—intermediate single with two rows of petals; right—intermediate standard single with several rows of petals.





Left—informal single, or daisy type, with one row of petals; right—Pink Exquisite, with its interesting, twisted center.

the flowers. Example: The Chief and Melba. Some semidouble varieties may have quilled petals with semispoon tips, as Laurinda Early.

III. Anemone Section (table 5).

The flowers resemble singles with 1 to 5 rows of ray petals, but the central florets are raised to form a cushion. This cushion may be relatively small as in Frieda and The Titan or it may be

broad and high as in Estrelita and Sincerity.

A. Regular Anemone. Ray petals evenly spaced and of about equal length.

1. Small Regular Anemone: not over 2 inches in diameter. Examples: Gypsy, Izola, Rhapsody, Burning Ember, Little Princess, Lavender Mist.
2. Intermediate Regular Anemone:

Left—one form of anemone type with large cushions; right—a group of anemone-type blooms with cushion centers.





Left—the small pompon button type is well illustrated by Nuggets; right—an example of intermediate pompon type.

over 2 inches but under 4 inches in diameter. Examples: Little America, Garza Supreme, Shasta, Smiths Innocence.

3. Large Regular Anemone: 4 inches or more in diameter. Examples: Frieda, Norma, Pink Supreme, White Supreme.

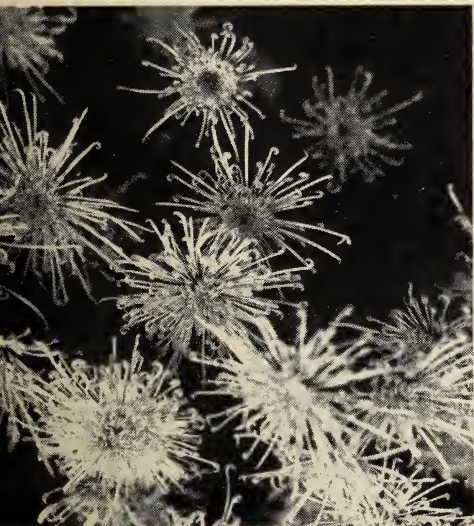
B. Irregular Anemone. Ray petals long and irregular in length, usually pointed, may be twisted; blooms usu-

ally over 4 inches in diameter. Examples: Tuxedo (pink), Bronze Tuxedo, Yellow Tuxedo. (Note: Anemone spoon types are listed under Spoon Chrysanthemums.)

IV. Pompon and Decorative Section (table 6).

The flowers in this section are rarely over 4 inches in diameter, and many are much smaller. There is no disk

Left—the spider type has petals with hooked tips; right—the matchstick type has tubular petals with small spoon tips.



showing when the flowers are fully open. The strap-shaped petals are found in many rows. Any disk flowers present are hidden by these petals.

A. Standard Pompons. Blooms range in size from small buttons to more than $2\frac{1}{2}$ inches in diameter, but are rarely over 4 inches. The flowers are usually globular in shape or flattened in the small button type. The petals are usually straight. (See table 6.)

1. Small Pompons (includes Button) : less than $1\frac{1}{2}$ inches in diameter. Examples: Baby, Irene, Isabel, Jewell, Nuggets, Pinocchio.
2. Intermediate Pompons: at least $1\frac{1}{2}$ inches but less than $2\frac{1}{2}$ inches in diameter. Examples: Captain Cook, Cassandra, Mrs. Bulkeley.
3. Large Pompons: over $2\frac{1}{2}$ inches in diameter. Examples: the several color forms of Doty, Arcadia, Goldsmith.

B. Decorative or Reflexed Pompons. These resemble the larger standard pompons, except that the petals are reflexed; occasionally, however, some of the central petals may be incurved for a time. Petals usually shorter and narrower than in Decoratives listed below.

1. Small Reflexed Pompons: under $1\frac{1}{2}$ inches in diameter. Examples: Bright Eyes, Mary Pickford.
2. Intermediate Reflexed Pompons: at least $1\frac{1}{2}$ inches but less than $2\frac{1}{2}$ inches in diameter. Examples: Clara Jameson, Yellow Dot.
3. Large Reflexed Pompons: over $2\frac{1}{2}$ inches in diameter. Example: Navaho.

C. Decoratives. Blooms more than $1\frac{1}{2}$ and less than 4 inches in diameter. Petals somewhat longer and narrower than in the reflexed pompons, and may be pointed; either regularly or irregularly reflexed; inner petals sometimes incurved for a time. Many of the hardy garden



Commercial spider; petals are usually tubular for part of length; good substance.

varieties fall within this class, and may be divided into: (1) Small, (2) Intermediate, and (3) Large. Examples: Avalanche, Lavender Lady, Natoma.

V. Spoon and Matchstick Section (table 7).

Usually singles with 1 to 5 rows of ray petals, tubular for part of their length and flared out into a spoon at the tip. A few anemone spoon varieties are listed, and these have a crested center. Semidouble and double spoon types are grown occasionally.

A. Standard Spoon. Ray petals tubular for about half their length, and tips flared out into a large spoon. Should not have more than 5 rows of ray petals. The disk is conspicuous, with short, even florets.

1. Small Standard Spoon: not over 2 inches in diameter. Example: Dr. Carl Norheim (developed by Oakland Park Department).
2. Intermediate Standard Spoon: more than 2 inches but less than 3 inches in diameter. Examples: Edward T. Foulkes and Commander Norman Miller.



Left—the incurved commercial type (as shown also on cover); right—an incurved exhibition type.

3. Large Standard Spoon: over 3 inches in diameter. Examples: Scintillation, Freda Leach.

B. Matchstick or Semispoon Type.

About the same as the Single Spoon, except that the ray petals are tubular for well over half their length, and the tips are slightly flared into a small spoon. Some growers place this type in with the Single Spoon or Quilled Single, but judges prefer the Single Spoon as listed above when the two are grouped together. Several varieties may be listed as semispoon in form, and some varieties (for instance, Frolic, Jean Squire) may either be listed here or placed in a separate class. Novelties, such as Oriana, are best segregated into odd or novelty varieties. There may be some variation in the form of flowers on the same plant. Examples: Matchsticks, Pink Matchsticks, White Matchsticks, Robert Bacon, Snow Queen, Yomei.

C. Anemone Spoon. Same as Single Spoon, except for cushion center. Examples: Otto Blum, Reverie.

VI. Quilled Section (table 8).

The flowers should be fully double with no disk showing. The florets are long, straight, tubular, or quilled, and often radiate to make a spherical bloom. The tips of the petals may be slightly spoon-like or curved slightly, but should not be coiled or hooked. May be subdivided into Small, Intermediate, and Large. Examples: Albert Witt, Bess Witt, Copper Rocket, Miss Gena Harwood, Peggy Ann Hoover, Rayonnante. (Note: This group is often listed with the Spider Section, but the tips are not curled as in true spider varieties.)

VII. Thread Section.

Petals are very slender and threadlike, usually tubular and either straight or slightly curved. The tips of the petals should not be definitely coiled or hooked. Example. Mignonette, White Thread, and Zaza. These are much like a miniature quilled variety, but the petals may be more curled and twisted.

VIII. Spider Section (table 8).

The blooms are usually large, fully or partially double, often with tubular



Left—a good example of an irregular incurved type; right—a typical reflexed type. Both of these are commercial types.

petals, either reflexed or incurved and sometimes twisted. The exhibition varieties are usually tubular, and many lack good substance, while the commercial varieties may have thick, broad petals of good substance, and are normally fully double; tips definitely coiled or hooked and either open or closed.

A. Exhibition Spiders. Includes the many spider varieties with long, slender petals; a great many do not have good substance. A few are semidouble (Jumbo, Pink Fantasy, Sunspot, Wilhelmina), but most are fully double (Bunbu, Butterfly, Emerald Isle, Lavender Beauty, Punch Bowl, Kay Tashima, and Wai-kiki). The size may be small, intermediate, or large.

1. Small Exhibition Spider: small tubes. Example: Silver Drops.
2. Intermediate Exhibition Spider: medium tubes. Examples: Butterfly, San Marino, Snowy.
3. Large Exhibition Spider: large or giant tubes. Examples: Jumbo, Kay Tashima, Marsha, Oriental, Silver Lace.

B. Commercial Spiders. Either flat or tubular petals of good substance and keeping quality, incurved or reflexed. Example: Mamoru.

IX. Feathered or Hairy Section.

The flowers are double with quilled petals that are covered with small hairs (ciliated). Formerly this class was known as Ostrich Plume, and today the class is best known by J. C. Taggart and Yellow Taggarts.

X. Large Commercial and Exhibition Section.

In general the flowers are large, especially in the exhibition varieties. There is no clear distinction, however, between commercial and exhibition varieties. Instead, it is better to segregate the varieties according to the form of the flowers, and then indicate size where size is important.

A. Regular Incurved. Petals are broad, overlap regularly and smoothly, and cover over the center of the flower, giving each bloom a globular shape. Many of the commercial varieties of earlier days were in this group.

1. Small Regular Incurved: blooms not over 5 inches in diameter. Example: Hilda Bergen.
2. Intermediate Regular Incurved: blooms more than 5 inches but not over 7 inches in diameter. Examples: Anaconda, Lillian Foltz.

3. Large Regular Incurved: blooms over 7 inches in diameter. Examples: Ambassador, Orchid Queen, Sunnyslope Bronze.

B. Irregular Incurved. Petals are twisted and irregularly incurved. The blooms are globular in outline. Here belong the Turners, Pockets, and many other varieties commonly listed under Exhibition.

C. Regular Reflexed. Petals evenly spaced and regularly reflexed and

overlapping. The blooms are globular in general outline. Sometimes listed under Reflexed Commercial. Examples: Garnet King, Harvard.

D. Irregular Reflexed. Petals are broad and twisted and overlapping. The blooms are usually very large, as in Princess Teru. The size helps place these varieties in Large Exhibition in some listings: small, up to 7 inches in diameter; large, over 7 inches in diameter.

SUGGESTED READING LIST

CUMMING, ALEX, JR.

1945. Hardy chrysanthemums. (Rev. ed.) 168 p. Doubleday and Company, Inc., New York.

HERRINGTON, A.

1929. The chrysanthemum. 170 p. Orange Judd Publishing Company, New York.

LAURIE, ALEX

1930. Chrysanthemums under glass and outdoors. 110 p. A. T. De La Mare Company, Inc., New York.

LAURIE, ALEX, and D. C. KIPLINGER

1946. Garden and greenhouse chrysanthemums. 123 p. A. T. De La Mare Company, Inc., New York.

1948. Commercial flower forcing. (5th ed.) 550 p. The Blakiston Company, Philadelphia.

MACSELF, A. J.

1939. Chrysanthemum growers treasury. 290 p. W. H. and L. Collingridge. Ltd., London.

NIWA, TEIZO

1936. Chrysanthemums of Japan. 56 p. (80 colored plates.) G. E. Stechert, New York.

PORTLAND CHRYSANTHEMUM SOCIETY

1946. Chrysanthemums: how to grow them out of doors. (Rev. ed.) 97 p. Portland Chrysanthemum Society, 2905 N.E. 38th Ave., Portland, Oregon.

POST, KENNETH

1949. Florist crop production and marketing. 891 p. Orange Judd Publishing Company, New York.

SANDERS, T. W.

1930. Chrysanthemums and how to grow them. 32 p. W. H. and L. Collingridge, Ltd., London.

SCOTT, E. L., and A. H. SCOTT

1950. Chrysanthemums for pleasure. (2d ed.) 320 p. The Scotts, 64 South Street, Bogota, New Jersey.

SMITH, ELMER D., and ALEX LAURIE

1928. Chrysanthemum breeding. 30 p. Michigan State College Special Bul. 186. (Out of print; available at some public libraries.)

WHITE, E. A.

1930. The chrysanthemum and its culture. 192 p. Orange Judd Publishing Company, New York.



TABLES OF VARIETIES

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Table 1. SINGLE VARIETIES

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Alex Stribling	white when fully open	med.	Oct. 15	good sturdy early single of good size
Apple Blossom	light pink	med.	Nov. 1	many small flowers
Apricot Valencia	apricot bronze	tall	Nov. 15	sport of Valencia
Bittersweet	bittersweet red	med.	Nov. 1	3 to 4 rows of stiff petals
Blaze	deep cardinal red	tall	Dec. 10	easy to grow; medium size
Brocade	cameo pink	med.	Nov. 15	medium size
Bronze Buckingham	apricot bronze	med.	Nov. 5	popular; medium size
Bronze Daisy	light bronze	med.	Nov. 1	medium size
Bronze Godfrey	bronze	med.	Nov. 25	sport of Mrs. Godfrey
Burgundy Red	bright red	med.	Oct. 25	large single; keeps well
California Red Daisy	brilliant red	med.	Oct. 5	medium size
Carnelia	bittersweet red	med.	Nov. 5	stiff stems
Charlotte Waite	rose pink, yellow center	short	Nov. 25	round, dwarf plant
Crimson Carnelia	intense crimson	med.	Nov. 1	holds color well; sport of Carnelia
Crimson Monarch	bright crimson	med.	Nov. 15	very large, with small center
Dark Pink Valencia	deep orchid pink	tall	Nov. 25	medium size
Debutante	deep pink	tall	Nov. 30	one of the best
Derrick Norman Lehmer	pink	tall	Oct. 25	large, vigorous plant
Europa	cardinal red	short	Nov. 10	strong stem; good spray
Evelyne Lethbridge	orange with crimson flush	tall	Nov. 10	medium size, fine for cutting
Fiesta	terra cotta reddish bronze	tall	Nov. 20	large and full
Gladys Duckham	white	med.	Dec. 15	large; good keeper
Golden Jane	clear yellow	med.	Nov. 20	
Golden Mensa	golden yellow	med.	Nov. 1	shaped like Shasta daisy; sport of Mensa
Golden Sun	yellow	tall	Nov. 10	good keeper
Gretchen Piper	brilliant yellow	med.	Oct. 15	large
Helen Hubbard	red like Harvard	tall	Nov. 15	good keeper
H. Marie Totty	crimson	tall	Nov. 10	large; late
Ida Skiff	amber bronze	med.	Oct. 25	excellent color; good cut flower
Jane	buff bronze	tall	Nov. 25	large; sport of Valencia
Jean	pure white	med.	Nov. 1	large; fine for exhibition
Jennifer	bright yellow	tall	Nov. 15	sturdy
Kramers Late Peach	light peach	med.	Dec. 15	good free-blooming late variety
Lodestar	golden yellow	med.	Nov. 25	medium size
Los Angeles	salmon pink	tall	Oct. 5	prolific bloomer

Table 1. SINGLE VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Louise Mayo	gold and lavender	tall	Nov. 1	large with stiff stem
Mabel Seymour	white, greenish shading	med.	Nov. 1	large with large sprays
Masons Bronze	burnt orange	med.	Nov. 10	broad petals
Masons Red	bronzey red	med.	Nov. 10	sport of Masons Bronze
Melba	orange bronze	med.	Nov. 5	semidouble
Mensa	pure white	med.	Nov. 25	certificate by C.S.A.; large; popular
Minnesota	brilliant red	med.	Nov. 1	medium size; good sprays
Mori Apricot	deep apricot	med.	Oct. 25	large, flat flower
Mrs. McKinney	bright buttercup yellow	tall	Nov. 1	large single
Mrs. Godfrey	light pink	med.	Nov. 25	good keeper; popular, strong grower
Mrs. Buckingham	pink	med.	Nov. 5	popular commercial
Nancy Copeland	spectrum red	med.	Sept. 25	med. size; early red
North Star	white	med.	Sept. 25	
October Bronze	light bronze	med.	Oct. 25	intermediate single
October Pink	light lavender	med.	Oct. 25	good cut flower
Patricia Ann	salmon pink	med.	Oct. 25	new; very productive
Pink Louise Mayo	orchid pink	med.	Nov. 10	strong, erect, large
Pink Mensa	bright pink	med.	Nov. 20	seedling of Mensa
Pink Skiff	pink	med.	Nov. 1	seedling of Ida Skiff
Radiant	brilliant red	med.	Nov. 5	very prolific; suitable for cascade
R. Collins	bronze	tall	Nov. 15	large; good keeper
Red Daisy	deep red	med.	Nov. 5	intermediate single
Red Melba	light red	med.	Nov. 5	large; sport of Melba
Red Valencia	soft Brazil red	med.	Nov. 20	large single
Rosalind	rose pink	tall	Dec. 20	good stems
Rose Jewell	bright rose, white central zone	short	Nov. 5	good low potted plant
Santa Anita	bronze	med.	Oct. 25	as good as Ida Skiff
Sarong	crimson scarlet	med.	Dec. 15	medium-sized flowers
Silver Moon	creamy white	med.	Sept. 15	medium-sized flowers
Sunkist	golden yellow	med.	Dec. 20	very late
Sylvannia	orange bronze	med.	Nov. 10	intermediate single
Tagoya	bright red	short	Nov. 1	good pot plant; semi-double
Vagabond	apricot buff	med.	Nov. 15	small center; ships well
Valencia	pink flushed gold	med.	Nov. 20	one of the best
White Fragrance	white	tall	Oct. 25	similar to Mensa, but taller
Yellow Daisy	deep lemon yellow	med.	Nov. 1	intermediate single
Yellow Frieda	lemon yellow	med.	Nov. 15	large single
Yukon	white	tall	Dec. 1	medium-sized flowers, late

Table 2. HARDY VARIETIES
(Includes some cushions, Northland daisies, and Koreans)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Allegro	white	med.	Oct. 1	large flowers if disbudded
Amelia	shades of pink	short	early	original cushion 'mum
Apricot Glow	apricot bronze	short	late summer	2 to 2½ inches across
Astrid	soft pink	short	Oct. 1	a Northland daisy
Avalanche	white	med.	Sept. 10	fine intermediate decorative
Aviator	coppery red	med.	Oct. 10	intermediate decorative
Bokhara	carmine and crimson	med.	Oct. 10	disease-resistant double
Burgundy	Burgundy red	tall	Oct. 10	Korean intermediate decorative
Burma	bronze, copper, and pink	med.	Oct. 5	well-branched sprays
Carnival	bronze, red, and golden bronze	med.	Oct. 10	large productive double
Chippewa	aster purple, silvery mauve reverse	med.	Sept. 25	large, slightly incurved
Coral Sea	coral cream	short	Oct. 1	full, 2 inches; good potted plant
Cydonia	orange, red overcast	tall	Oct. 5	2 inches; glowing color; vigorous
Golden Cushion	golden yellow	dwarf	Oct. 5	stocky cushion
Ideal Pink	soft orchid	med.	Oct. 15	good decorative
Indian Summer	orange bronze	med.	Oct. 15	informal; stiff stems
Jean Treadway	soft pink	med.	Oct. 10	fine for garden cutting
Jewell	lavender pink	short	Oct. 5	large bottom
Karl A. Reiche	old rose and strawberry red	med.	Sept. 25	upright; good grower
Lavender Lady	light lavender	med.	Oct. 5	intermediate decorative; excellent
Magnolia	pink tinted creamy white	med.	Sept. 15	stocky, productive
Mandalay	orange bronze	med.	Sept. 20	good stems, many flowers
Maroon n' Gold	mahogany shaded maroon, gold reverse	short	Aug. 25	large flowers, good stems
Mellow Glow	orange, buff, pink, and bronze	med.	Oct. 5	good cut flowers
New Philadelphia	purplish red	tall	Oct. 15	decorative pompon, distinctive
Philadelphia	orchid lavender	tall	Oct. 15	decorative pompon pleasing color
Pink Radiance	luminous pink	med.	Sept. 25	productive, decorative pompon

Continued next page

Table 2. HARDY VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Pomponette	bright yellow	short	Oct. 1	good potted plant
Polar Ice	white	short	Oct. 1	bushy decorative
Rapture	orange and carmine	med.	Oct. 15	good garden plant
Red Ridinghood	bright red	med.	Oct. 1	blazing color, fine decorative
Ruby Pompon	ruby crimson	med.	Oct. 5	one of the best, fine sprays
Sequoia	amber	med.	Oct. 10	outstanding variety
Tiffany Rose	deep rose with cream undertone	short	Oct. 10	free-flowering bushy plant
Twilight	fuchsia purple, silver reverse	med.	Oct. 5	attractive decorative
White Wonder	white	tall	Oct. 1	free-flowering pompon
Yellow Avalanche	golden yellow	med.	Sept. 25	good sprays
Yellow Jewell	yellow with bronze undertone	short	Oct. 5	good pompon

**Table 3. ODD VARIETIES AND INTERESTING FORMS
(Many spider and spoon varieties could be included)**

Name	Color	Form	Height	Blooms outside
California Firebird	bronze and gold	decorative with form like small cactus dahlia	tall	Nov. 25
Emerald Isle	light green at center	threadlike spider	med.	Nov. 1
Ensenada	Indian red with yellowish reverse	like small cactus dahlia	med.	Nov. 1
Fantasia	white	odd quilled petals, tips reflexed spoons	tall	Nov. 5
J. C. Taggarts	soft bronze	feathered or hairy petals	tall	Nov. 1
Kegon No Taki	bright yellow	lower petals reflexed, others incurved, twisted	tall	Nov. 1
Lavender Taggarts	lavender, shading pink at center	feathered or hairy petals	tall	Nov. 1
Louis Fried	silver gray quills, amaranth red spoons	spoonlike variety	med.	Nov. 10
Mabel Seymour	white with greenish shading	large single	med.	Nov. 1
Nightingale	white with greenish center	oddly colored spider type	med.	Nov. 1
Pink Exquisite (see illus. p. 24)	pleasing pink	whirled central petals	med.	Nov. 1
Revere	orchid pink	a novelty spoon	med.	Nov. 1
Sunspot	white	tubular petals, hooked and barbed tips	tall	Nov. 1
Yellow Taggarts	yellow	feathery or hairy petals	tall	Nov. 1

Table 4. SOME VARIETIES FOR TRAINING AS CASCADES

Name	Type	Color	Flower Size	Blooms outside (most are late)	Remarks	
Anna	single or daisy	white with yellow center	2 inches	Oct. 20	popular	
Bettina	single	dark pink	1½ inches	Oct. 20	spoon tips	
Bijo	single	light pink	small			
Breaking Dawn	anemone	light pink	1½ inches			
Brickette	single	bright red	very small	Oct. 1	lasts well small flowers	
Bridal Veil	single	snowy white	to 3 inches			
Burning Ember	anemone	bright red rays, yellow cushion	1 inch			
Butterfly	spider	yellow	4 inches up	Oct. 25	good yellow requires little pinching	
Cherry Rose	single	rose pink	small	Oct. 10		
Chinook	single	salmon pink	2 inches	Oct. 30	free bloomer	
Firefall	single	garnet red, yellow center	2 inches			
Hallowe'en	anemone	bronze rays, deeper bronze cushion	small	Oct. 15 on	very branching	
Jane Harte	single	yellow	2 inches	Oct. 20	sport of Anna	
Kinro	anemone	bright yellow	small	Nov. 1		
Lavender Mist	anemone	lavender pink	small	Nov. 1	medium size tiny	
Lighthouse	single	bronzy red	medium	Nov. 1		
Little Princess	anemone	golden yellow	very small			
Moonlight	single	yellow	medium	Nov. 1	long stems	
New Gold	anemone	brilliant yellow	medium			
Niagara Falls	single	creamy white	2 inches	Oct. 20	for small cascade	
Nuggets (see illus. p. 11)	pompon (button)	rich golden yellow	1 inch	Oct. 25		
Orchid Beauty	anemone	orch. pink rays, yellow cush.	medium	Nov. 15	for small cascade	
Princess	single	light lavender	medium	Nov. 1	vigorous	
Purple Queen	anemone	deep purple	2½ inches			
Radiant	single	bright red	medium	Nov. 5	medium size	
Rhapsody	anemone	lavender	1 inch	Nov. 1	short ray petals	
Royalty	anemone	deep lavender pink	2 inches		short flat ray petals	
The Real McKay	single	pink	2 inches	Oct. 15	prolific, good habit	
Tuxedo	anemone	light pink	medium to large	Nov. 1	good small cascade	
Violet Ray	anemone	dark lavender	medium		quilled florets	
Yamabuki	anemone	yellow	1½ inches		outstanding	

Table 5. ANEMONE VARIETIES

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Small Flowers				
Bronze Izola	reddish bronze	med.	Nov. 1	sport of Izola
Golden Izola	bright golden	med.	Nov. 1	sport of Izola
Gypsy	light reddish bronze	med.	Nov. 15	
Izola	amaranth	med.	Nov. 1	
Lavender Mist	lavender pink	dwarf	Nov. 1	used some as cascade
Pink Izola	lavender	med.	Nov. 1	
Purple Daisy	aster purple	tall	Nov. 10	heavy producer
Red Izola	deep red	med.	Nov. 1	
White Izola	white	med.	Nov. 1	sport of Izola
Yolanda	light orange bronze	med.	Nov. 25	holds color well
Intermediate Flowers				
Blanche	white	med.	Nov. 5	
Garza Supreme	white	med.	Dec. 15	later than Garza
Gerald Beaumont	pink with orange cushion	med.	Nov. 20	good color
Halloween	coppery bronze	med.	Nov. 20	flowers 3 inches across
Little America	white	med.	Nov. 5	good keeper
Nevada	white	med.	Nov. 20	green cushion
Orchid Beauty	orchid	med.	Nov. 15	good pot plant
Red Rolinda	reddish brown	tall	Nov. 25	very prolific
Rolinda	bronze	tall	Nov. 25	very prolific
Rose Madder	rose pink	med.	Nov. 15	prominent cushion
Shasta	white	med.	Nov. 5	
Sincerity	white	med.	Oct. 25	high rounded cushion
Smiths Innocence	white	tall	Nov. 5	petals slightly reflexed
Sunray	light lemon yellow	med.	Nov. 15	small to medium flowers
White Anemone	white	tall	Nov. 5	
Yellow Garza Supreme	light lemon yellow	med.	Dec. 15	sport of Garza Supreme
Yellow Rolinda	light buff yellow	med.	Nov. 25	sport of Rolinda
Yellow Sincerity	yellow	med.	Oct. 25	sport of Sincerity
Large Flowers (most suitable for disbudding)				
Admiration	deep orchid pink	med.	Oct. 15	sturdy grower; orange cushion
Antigo	deep rose	med.	Nov. 1	ray petals and cushion same color
Beautiful Lady	bright pink	short	Nov. 20	creamy cushion
Bob White	white	med.	Nov. 5	bright golden cushion
Bronze Norma	golden bronze	tall	Dec. 1	sport of Norma
Bronze Tuxedo	apricot bronze	tall	Nov. 1	sport of Tuxedo
Buff Queen	golden bronze	tall	Nov. 1	one of the older varieties
Captivation	mahogany red	med.	Nov. 10	cushion reddish bronze
Catherine	lavender pink	med.	Nov. 10	holds color well

Continued next page

Table 5. ANEMONE VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Large Flowers—Continued				
China Rose	blood red	short	Nov. 1	large cushion
Citrus Queen	lemon yellow	med.	Dec. 1	orange disk
Coral Blaze	deep orange bronze	short	Nov. 25	good keeper
Cora Scoville	bright bronze	med.	Nov. 5	flat cushion
Dark Pink Norma	deep lavender	tall	Nov. 18	habit like Norma
Doris Louise	deep rose	med.	Oct. 15	sport of Frieda
Enchantress	deep pink	med.	Dec. 5	good deep pink
Estrelita	buff bronze	med.	Nov. 15	large flat disk
Frances Schoen Park	pure white	med.	Nov. 10	good exhibition variety
Frieda	orchid pink	tall	Oct. 5	small cushion
Gleam	deep lemon yellow	med.	Dec. 5	a newer variety
Graf Von Avon	white with pink tinge	tall	Nov. 10	available in Southern California
Helios	deep golden yellow	med.	Nov. 10	one of the older varieties
Irene Hayes	white	med.	Nov. 15	high cushion
Jeanette	bronze	med.	Nov. 5	high cushion
Long Island Beauty	white to light pink, yellow cushion	tall	Nov. 20	vigorous; older flowers suffused pink
Loucella	bronzy orange	short	Nov. 5	
Marietta	soft pink	med.	Oct. 20	
Maritza	bright yellow	tall	Nov. 25	semi-incurved
Matador	red	tall	Dec. 15	good disbudded
Mrs. Charles Wylie	light bronze	med.	Nov. 5	high cushion
Mrs. John Shields	sulfur yellow	med.	Oct. 30	dark lemon cushion
Mrs. J. S. Roberts	crimson mauve and violet	med.	Nov. 10	long disk florets
Norma	delicate pink	tall	Dec. 1	bronzy yellow cushion
Peter Pearson	light pink	med.	Dec. 1	high yellow cushion
Pink Supreme	pale pink	tall	Dec. 15	yellow cushion
Red Graf Von Oriola	bright crimson	tall	Nov. 1	sport of Graf Von Oriola
Spotlight	crimson	tall	Nov. 5	yellow cushion
Sunshine	golden yellow	tall	Nov. 15	yellow throughout
Susanne Miller	buff yellow	tall	Nov. 25	sport of Norma
Swan	white	tall	Dec. 10	fine bloom
The Titan	scarlet crimson	tall	Nov. 5	stiff stems
Topknot	bright pink	tall	Nov. 1	high white cushion
Triumph	deep canary yellow	med.	Nov. 1	reflex
Tronesta	bright pink	med.	Oct. 15	yellow cushion
Tuxedo	light pink	tall	Nov. 1	one of the best
Verona	buff	med.	Oct. 20	full cushion
White Frieda	white	tall	Oct. 15	habit of Frieda
White Norma	white	tall	Dec. 1	sport of Norma
White Supreme	white	med.	Nov. 1	
Wilfreda	creamy yellow	tall	Nov. 15	one of older varieties
Yellow Estrelita	bright golden yellow	tall	Nov. 15	sport of Estrelita
Yellow Loucella	bright yellow	med.	Nov. 5	very prolific
Yellow Supreme	buff yellow	tall	Dec. 10	not common in California
Yellow Tuxedo	clear yellow	tall	Nov. 1	sport of Tuxedo

Table 6. POMPON VARIETIES

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Small or Button Pompoms				
Aaron	bronzy scarlet	short	Oct. 15	long season
Adorable	yellow	med.	Dec. 1	good late yellow
Argo	soft pink	med.	Nov. 1	productive
Baby	bright yellow	short	Nov. 15	very popular; smallest button
Baby Doll	yellow with red center dot	med.	Oct. 15	very small button
Baby Grand	deep rose pink	tall	Nov. 10	graceful sprays
Bobette	lavender with darker center	short	Dec. 5	many blooms
Bright Eyes	blush with rose center	short	Nov. 1	
Bronze Dot	light bronze	tall	Oct. 25	sport of Pink Dot
Bronze Mrs. Roenig	bright chestnut	med.	Nov. 1	large sport of Mrs. Roenig
Bronze Perfection	dark reddish bronze	med.	Nov. 15	large button
Brown Button	bronze	tall	Nov. 10	prolific
Cho Cho	pink	med.	Nov. 10	large, excellent quality
Christmas Gold	bright yellow	med.	Dec. 1	
Clara Jameson	bronze	med.	Nov. 1	small, reflexed, good substance
Clare	white	med.	Nov. 15	small, compact
Dainty Maid	blush pink	med.	Oct. on	baby button
Dark Pink Jewell	deep lavender	med.	Oct. 15	sport of Jewell
Dolora	dark bronze	med.	Nov. 15	
Dorothy Nehrling	deep rose	tall	Nov. 15	good pink button
Eileen	bright cherry red	med.	Oct. 1	
Ethel	bright red	short	Oct. 25	productive
Geraldine	lemon yellow	med.	Dec. 1	good large button
Gold Coast	deep lemon yellow	med.	Oct. 25	fine large button
Golden Charm	bright gold	med.	Oct. 1	good substance
Harmony	deep orange shading red	tall	Nov. 25	interesting color
High Lights	white, salmon pink, mahogany center	tall	Nov. 1	good keeper
Hilda Canning	dark bronze	tall	Nov. 25	fine sprays
Irene	pure white	short	Oct. 15	good substance
Isobel	deep pink	short	Oct. 25	shape like Nuggets
Jewell	pink	med.	Oct. 15	shape like Nuggets
Judith Anderson	golden yellow	med.	Oct. 15	stocky plant
Little Tot	pale rose	short	Nov. 15	good sprays
Little Truant	dark bronze	short	Nov. 20	
Lois	dark gold shading orange	med.	Nov. 5	shape like Nuggets
Marguerite Clark	rose pink	tall	Nov. 25	good sprays

Table 6. POMPON VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Small Button Pompons—Continued				
Martha	yellow	med.	Nov. 15	feathered button type
Mary Pickford	white	short	Nov. 1	ball-like
Minong	white	stocky	Oct. 20	ball-like
Mission	lt. rose, darker center	short	Nov. 1	good pot plant
Mrs. Needles	bright pink	short	Nov. 1	good pot plant
Mrs. Roenig	deep rose pink	med.	Nov. 1	sturdy grower
Nancy Crain	white, diffused orchid, brown eye		Nov. 5	easy grower, large
Nesco	rose pink	med.	Oct. 20	large
New York	buff with crimson ctr.		Nov. 1	large, good sprays
Nuggets (see p. 25)	golden yellow	med.	Oct. 25	stiff stems
Patsy Dowd	red	short	Nov. 5	good red
Penelope	brilliant yellow	short	Oct. 25	short button
Persian Rose	deep rose pink, shad- ing purple	med.	Oct. 23	open sprays
Pink Dot	light pink with crimson center	tall	Oct. 25	good sprays, reflexed
Pinkettee	soft pink	med.	Nov. 1	good for bunching
Pink Pearl	rose pink	med.	Oct. 25	large
Pinocchio	glistening white	tall	Oct. 25	fine small flowers
Pixie	golden yellow	med.	Nov. 10	fine small flowers
Purple Button	amaranth purple	tall	Nov. 1	off color
Red Persian Rose	raspberry red	short	Oct. 25	good pot plant
Robin Hood	deep red	med.	Nov. 1	medium button
Rufus	crimson maroon	med.	Nov. 1	medium button
September Gems	golden yellow	med.	Sept. 15	wiry stems
Silver Bells	white	med.	Nov. 1	ball-like
Snow Cloud	pure white	med.	Oct. 20	heavy branching
Svea	golden bronze	med.	Nov. 1	good pot plant
Thyra	deep lavender	med.	Nov. 1	large novelty
Tokyo	canary yellow	tall	Dec. 20	hardy, late, large
Varsity	rich yellow	med.	Nov. 1	small
Vivian Martin	lt. yellow, dkr. center	tall	Nov. 1	
Yellow Dot	rich yellow, reflexed	med.	Nov. 1	Very small sport of Pink Dot
Yellow Irene	lemon yellow	med.	Oct. 20	good producer; sport of Irene
Intermediate Pompons				
Barcarole	golden yellow	tall	Nov. 5	good producer
Bright Spot	deep old rose	med.	Nov. 1	good sprays

Table 6. POMPON VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Intermediate Pompons—Continued				
California Beauty	deep purple	med.	Nov. 10	good stems and sprays loose form
California Firebird	bronze shaded gold at tips	tall	Dec. 1	
Cavalcade	mandarin red	med.	Dec. 10	good sprays
Cameo	ivory white	med.	Dec. 5	
Captain Cook	deep rose pink	med.	Oct. 23	more rigid stem than Pink Dot
Caroline Yosick	lavender pink	med.	Oct. 20	
Cassandra	bright orange	med.	Nov. 1	good color
Chicago Pearl	ivory white	med.	Nov. 15	
Christmas Cheer	deep yellow	med.	Dec. 15	
Christmas Red	deep red	med.	Dec. 10	
Crimson Dot	yellow shading to crimson eye	tall	Oct. 25	
Dark Pink Bulkeley	deep rose pink	tall	Oct. 25	
Debonair	rich crimson	med.	Dec. 5	vig., popular decorative
Derigold	golden yellow	med.	Nov. 10	
Frances Huckvale	gardenia white	med.	Nov. 1	
Golden Emblem	golden yellow	med.	Nov. 20	
Golden Spray	yellow	med.	Oct. 10	good yellow
Golden Surprise	sulfur yellow shading	med.	Nov. 20	
Illini Snowflake	clear white	med.	Nov. 5	
Ivory Snow	deep ivory	med.	Dec. 30	
Jemima	reddish bronze	med.	Oct. 23	good cut flowers
Jessie	lavender	med.	Oct. 25	
Joan Wells	bronze	tall	Oct. 15	good producer
Lakme	white with chartreuse eye	med.	Nov. 12	
Martha	golden yellow	med.	Oct. 25	good feathered pompon
Masterpiece	tourmaline pink	med.	Nov. 15	
Matchless	white	tall	Nov. 15	like Mrs. Bulkeley
Minuet	rosy pink	tall	Nov. 25	
Mrs. Bulkeley	orchid lavender	tall	Nov. 8	bushy and sturdy
Natoma	flame scarlet	short	Oct. 25	
Navaho	deep crimson	med.	Nov. 5	
Omega	lemon yellow	med.	Dec. 10	
Pomponette	light buff yellow	med.	Sept. 20	early
Priscilla	white	med.	Nov. 23	
Revelation	white decorative	tall	Dec.	late white
Rev. Bushnell	creamy white	med.	Nov. 8	
Riviera	pink	med.	Dec. 15	very showy decorative pompon
Rodell Improved	lemon yellow	med.	Oct. 20	
Roman Bronze	buff bronze	med.	Oct. 20	
Royal Queen	white	med.	Dec. 5	

Table 6. POMPON VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Intermediate Pompons—Continued				
Ruby Pompon	ruby crimson	med.	Oct. 5	good keeper sturdy grower good form good form
Rusticon	rust red	tall	Nov. 20	
Seafoam	clear white	med.	Nov. 20	
Sea Gull	creamy white	med.	Nov. 1	
Snow	clear ivory	med.	Dec. 30	
Sunnyside	golden yellow	med.	Nov. 25	
Trianon	crimson bronze	tall	Nov. 10	
Uneeda	lavender or rosy pink	med.	Nov. 25	
Usona	lavender	med.	Nov. 25	
Vesper	white	med.	Nov. 10	
White Yuletide	white	med.	Nov. 28	
Yellow Beauty	golden yellow	med.	Nov. 10	
Yellow Bushnell	pernet yellow	med.	Nov. 10	
Yellow Fellow	deep lemon yellow	med.	Nov. 15	
Yellow Hammer	golden yellow	med.	Oct. 20	
Yellow Sea Gull	lemon yellow	med.	Nov. 1	
Yellow Snow	deep lemon yellow	med.	Dec. 30	
Large Pompons (most are suitable for disbudding)				
Angelo	soft pink	tall	Oct. 5	sturdy grower good sprays fine sport of Goldsmith prolific sport of Masterpiece sport of Princeton good decorative pompon
Arcadia	pure white	med.	Oct. 25	
Azora	light pink	med.	Oct. 10	
Betty	bronze incurved	short	Sept. 1	
Bristolite	deep orange	med.	Nov. 10	
Bronze Doty	light bronze	tall	Nov. 5	
Bronze Goldsmith	deep reddish bronze	med.	Nov. 25	
Bronze Masterpiece	apricot bronze	med.	Nov. 15	
Bronze Princeton	deep bronze	tall	Nov. 15	
Bronze Source d'Or	orange with reddish shade	tall	Oct. 1	
California Pride	deep pink	tall	Nov. 5	good color and substance sturdy grower good stem and foliage waxy petals fine for late cutting
Dawn	orchid pink	tall	Nov. 10	
Diana	snowy white	med.	Nov. 5	
Dr. W. R. Pettit	pink	tall	Oct. 15	
Eden	deep rose	short	Oct. 25	
Elora	shell pink shading orchid	med.	Oct. 5	
Elsie Kramer	shell pink	med.	Dec. 10	
Firebird	reddish bronze with gold	med.	Oct. 25	
Golden Feather (Source d'Or)	golden yellow	tall	Oct. 1	garden or pot plant; decorative pompon

Table 6. POMPON VARIETIES (continued)

Name	Characteristics			Remarks
	Color	Height	Blooms outside	
Large Pompons—Continued				
Golden Victory	rich yellow	med.	Dec. on	good decorative pompon
Goldsmith	orange yellow	med.	Nov. 25	fine decorative for cut
Gracie Fields	deep old rose	tall	Nov. 5	long sprays
Granite State	pure white	short	Oct. 25	good pot or garden plant
Greta	white	med.	Oct. 1	prolific early pompon
Lillian Doty	shell pink	tall	Oct. 15	incurved; good cut flrs.
Mary Lennon Hall	bright yellow	tall	Oct. 20	erect grower
Masaka	bright yellow	tall	Oct. 10	good form
Masterpiece	clear pink	med.	Nov. 15	strong stem
Queen of Pinks	lavender pink	short	Nov. 10	
Red Doty	red	tall	Oct. 25	good cut flower
Red Robin	crimson	tall		late
Red Rust	red and gold	tall	Oct. 20	unusual color
Richard Mandel	white		Nov. 10	
Romola	light pink	med.	Oct. 20	fine color and form
Silver Ball	pure white	med.	Oct. 1	good early white
Spun Gold	deep lemon yellow	med.	Dec. 15	good decorative
William Sobey	canary yellow	tall	Oct. 15	
White Doty	clear white	tall	Oct. 25	good cut flower
Yellow Arcadia	golden yellow	med.	Oct. 25	
Yellow Beauty	golden yellow	short	Nov. 10	good garden or pot plant
Yellow Doty Improved	bright yellow	med.	Oct. 30	good cut flower; good foliage
Yuvawn	bright yellow	med.	Oct. 10	

Table 7. SPOON AND MATCHSTICK VARIETIES

Name	Type	Characteristics			Remarks
		Color	Height	Blooms outside	
Bishop of Henninghaus	spoon	creamy quills, dark red spoons	short	Nov. 25	
Bishop of Sutherland	spoon	straw quills, rosy red spoons	med.	Nov. 10	best disbudded
Brilliance	spoon	maize quills, grenadine-red spoons	med.	Oct. 15	distinct color
Captain Wm. Anahu	spoon	light pink	dwarf	Nov. 20	medium-sized flowers
Commander Norman Miller	spoon	golden yellow	med.	Nov. 20	good spoon
Cora Mae	long spoon	lavender quills	tall	Nov. 15	sturdy grower
Dr. Carl Norheim	spoon, single	orange yellow	med.	Nov. 20	small single spoon
Edward T. Foulkes	spoon	yellow	tall	Nov. 20	vigorous
Freda Leach	spoon	lavender pink, large	tall	Nov. 15	sturdy grower
Frolic	single spoon	golden yellow	low	Nov. 1	bushy plant
Joan Berger	spoon	orchid pink	med.	Nov. 5	vigorous
Laurinda Early	spoon tips	pure white	med.	Nov. 1	good disbudded
Luana Patten	spoon	red quills, gold spoons	med.	Nov. 10	one of the best
Matchsticks	spoon tips	light bronze quills, rose spoons	med.	Nov. 5	single
Mrs. Allen Morphy	spoon	shell pink spoons	med.	Oct. 26	light Scintillation
Mrs. Gwen Cheesewright	single spoon	grayish lavender quills, rose spoons	med.	Nov. 5	do not disbud
Ortha	spoon	salmon-bronze quills, bronzy red spoons	dwarf	Nov. 15	odd coloring
Otto Blum	spoon anemone	lavender	med.	Nov. 10	sturdy grower, flat cushion
Pauline	single spoon	soft yellow	med.	Nov. 1	bushy pot plant
Pink Matchsticks	spoon tips	light pink spoons	med.	Nov. 10	prolific
Pink Spoon	hardy spoon	pink quills, orchid spoons	short	Oct. 30	large spoon
R. Bacon	spoon tips	rose quills	med.	Nov. 15	large

Reverie	novelty anemone spoon	light pink tube, orchid-pink spoons	med.	Nov. 1	a few rows of irregular petals
Royal	spoon	silver quills, purple spoons	med.	Nov. 15	good disbudded
Scintillation	spoon tips	deep orchid pink	med.	Oct. 20	large exhibition
Snow Queen	single	pure white, spoon tips	med.	Nov. 1	large if disbudded
White Matchsticks	spoon tips	white spoons	med.	Nov. 5	
White Spoon	hardy spoon	white spoons	med.	Oct. 30	small
Yellow Spoon	hardy double spoon	brilliant yellow spoons	med.	Oct. 1	do not disbud
Yomei	spoon tips	golden quills, bright rosespoons	med.	Nov. 10	very attractive
Zola	reflexed	varying shades of pink	med.	Nov. 15	odd form but good

Table 8. SPIDER, THREAD, AND QUILLED VARIETIES

Name	Type	Characteristics			Remarks
		Color	Height	Blooms outside	
Agnes	hooked tips, reflexed	light orchid pink	tall	Nov. 15	good stem
Albert Witt	straight quilled petals	clear yellow	med.	Oct. 10	spout of Bess Witt
Alice Tashima	hooked tips	white	tall	Oct. 10	good stem
Arctic	hooked tips	white	med.	Oct. 15	graceful tips
Bertha Oliver	hooked tips	deep orchid-pink tip	med.	Oct. 15	tips open widely
Bess Witt	straight quilled petals	apricot bronze and salmon	med.	Oct. 10	spout of Peggy Ann Hoover
Blanca	hooked tips	satiny white	tall	Nov. 15	partly reflexed
Bronze Chief	hooked tips	bronze	med.	Nov. 20	strong stem
Bunbu	hooked tips, incurved	orchid lavender	med.	Nov. 1	large when disbudded
Butterfly	hooked tips	yellow	med.	Oct. 25	good foliage
Catalina	hooked tips	soft orchid pink	med.	Nov. 1	full-centered flowers
Cathay	hooked tips, slightly incurved	copper with red spoon	med.	Oct. 25	striking appearance
Chungking	hooked tips, upturned	deep champagne, shaded raspberry	tall	Oct. 20	slender tubular petals
Copper Rocket	straight quilled petals	coppery bronze, lilac sheen	med.	Nov. 5	keeps well
Daibusti	hooked tips	rosy cream	tall	Nov. 18	large when disbudded
Dainty White	hooked tips, reflexed	white	med.	Oct. 25	petals droop downward
Dubonnet	hooked tips, reflexed	light pink	med.	Nov. 15	good disbudded
Emerald Isle	hooked tips	greenish or creamy white	med.	Nov. 1	threadlike quills
Enchantress	hooked tips	pink	med.	Nov. 1	good pink spider
Florence Miller	hooked tips, ribbonlike	delicate lavender	med.	Oct. 15	study grower
Georgina Hedinger	hooked tips	pink, tips lined crimson	med.	Nov. 1	
Glistening White	hooked tips	white with amaranth center	med.	Nov. 15	
Jumbo	hooked tips, reflexed	white	tall	Oct. 25	large flowers
Katherine Louise	tips slightly hooked outward	light orchid	med.	Nov. 15	good late spider
Kay Tashima	slightly incurved hooked tips	white	med.	Oct. 1	large, good spider
Lavender Beauty	hooked tips curl upward	light lavender pink	short	Oct. 15	large flowers
Lorraine	tips curl inward	yellow	tall	Nov. 1	fine yellow

Mamoru	hooked tips	dark orange shaded bronze at center	med.	Oct. 30	good cut flowers
Marcia	hooked tips, reflexed	creamy white overcast green	med.	Oct. 15	large when disbudded
Marie Tashima	hooked tips, semi-reflexed	white	med.	Oct. 5	large flowers
Marsha	loose spider	white	short	Nov. 5	large flowers, tips only slightly curled
Mauve	hooked, reflexed outer petals	wine red	tall	Nov. 15	odd variety
Mignonette	thread	yellow	med.	Nov. 5	good thread type
Miss Gina Harwood	straight quilled petals	rosy mauve	tall	Oct. 15	sport of Rayonnante
Misuko	hooked tips	lavender, French-gray tip	med.	Nov. 10	
Mrs. Jerry Craig	hooked tips	golden bronze	med.	Oct. 15	has a full center
Mrs. V. Wood	tips hook inward	clear lavender pink	med.	Nov. 1	
Nightingale	hooked tips	white, greenish center	med.	Nov. 15	needs some shade for green color
Ohkwan	hooked tips	canary yellow	med.	Nov. 5	good pot plant
Orchid Delight	slightly hooked tips	light orchid pink	med.	Nov. 15	has a full center
Pali	hooked tips	pink	tall	Nov. 1	has good stem
Patricia Nelson	reflexed, tips curl upward	red and gold	med.	Nov. 5	a good keeper
Paul Miller	hooked tips	coppery buff, tips red	med.	Oct. 15	interesting color
Peggy Ann Hoover	straight quilled petals	light lavender pink	med.	Oct. 20	larger when disbudded
Pink Fantasy	hooked tips	light pink	tall	Oct. 20	good stem
Punch Bowl	reflexed, hooked tips curl upward	Burgundy red	med.	Nov. 1	loose form
Queen of Beauty	long quilled petals	pinkish lilac tipped creamy white	tall	Nov. 1	new
Rayonnante	cord-like quilled petals	light rose pink	med.	Oct. 15	best disbudded
San Gabriel	hooked tips	deep yellow	med.	Oct. 15	good potted
San Marino	tips curled slightly	bright yellow	med.	Nov. 25	slender petals, much like Butterfly
Sarah Morasch	hooked tips	rose to light pink	med.	Oct. 25	seedling of Punch Bowl
Seijin	hooked tips	pink fading to white	med.	Oct. 15	large quills
Silver Drops	hooked, barbed tips	white	med.	Nov. 30	slender petals
Silver Lace	reflexed, hooked tips	white	med.	Oct. 15	good for cutting

Continued next page

Table 8. SPIDER, THREAD, AND QUILLED VARIETIES (continued)

Name	Type	Characteristics			Remarks
		Color	Height	Blooms outside	
Souvenir	straight tubular	light salmon pink	med.	Oct. 25	large when disbudded
Susan Leighton	loose barbed tips	white	med.	Oct. 25	fine garden variety
Swansdown	reflexed spider	white	med.	Nov. 1	has full center
Sylvia	hooked tips	lavender pink, tips slightly red	med.	Oct. 15	very full center
Unique	stiff, small horizontal petals	deep wine red	tall	Nov. 10	unique petals
Virginia	horizontal petals, reflexed tips	clear yellow	med.	Nov. 10	good disbudded
Walkiki	hooked tips curled inward	apricot bronze, golden tips	tall	Nov. 1	strong stems
White Peggy Ann Hoover	long quilled petals	white	short	Nov. 10	sport of Peggy Ann Hoover
White Rayonnante	long quilled petals	white	med.	Oct. 15	sport of Rayonnante
White Thread	threadlike petals	white	med.	Nov. 1	open center
Yellow Rayonnante	long quilled petals	clear yellow	med.	Oct. 15	sport of Rayonnante
Yosemite	slightly barbed tips	canary yellow	tall	Nov. 1	best disbudded
Zaza	thread	yellow	med.	Sept. 20	fine yellow thread

In order that the information in our publications may be more intelligible, it is sometimes necessary to use trade names of products and equipment rather than complicated descriptive or chemical identifications. In so doing, it is unavoidable in some cases that similar products which are on the market under other trade names may not be cited. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

MOST CHRYSANTHEMUM varieties bloom in California from October through November, and certain selected varieties mature outdoors through late summer to Christmas flowering. The long dry season from early summer through the fall favors chrysanthemum culture. It preserves the blossoms, even though it demands frequent irrigation.

Varietal choice is wide, with final selection depending upon the amount of time a grower can give to the plants. For instance, large-flowered varieties demand much time for disbudding, whereas small-flowered varieties require little or no time for disbudding.

Chrysanthemums are subject to heavy damage by a few serious pests and diseases, but specific measures—both preventive and control—give satisfactory results.

These and other problems are described in this circular for both the experienced and the beginning grower under such headings as: propagating, planting, irrigating, fertilizing, regulating growth, producing new varieties, controlling pests and diseases, and picking flowers for home and for exhibit.

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